Appendix F

Data Usability Summary Reports

LABORATORY DATA CONSULTANTS, INC.
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Terraphase
222 International Drive, Suite 150
Portsmouth, NJ 03801
ATTN: Ms. Madison Ingling
madison.ingling@terraphase.com

June 13, 2025

SUBJECT: Elmwood Preserve - Data Validation

Dear Ms. Ingling,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on April 25, 2025. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #60943:

SDG #	**Fraction**
L2428224, L2428227, L2428534, L2428535, L2428918, L2428941, L2429225, L2429497, L2430766, L2430776, L2430854, L2431675, L2432392, L2432791, L2433398, L2433786, L2433800, L2434058, L2434335, L2434640, L2434763, L2435023, L2435284, L2435399, L2435512, L2435567	Pesticide, Metals, VOC, SVOC, Pesticide, PCB, Herbicide, Wet Chemistry, PFAS

The data validation was performed under Category B guidelines. The analysis was validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan, Elmwood Preserve (January 2025)
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005 (November 2020)
- USEPA National Functional Guidelines for Inorganic Superfund Data Review, EPA 542-R-20-006 (November 2020)
- Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager

LDC #60943 (Terraphase - Portsmouth, NH / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	VOCs (8260D)	SVOCs (8270E)	Pesticides (8081B)	PCBs (8082A)	Herbicides (8151A)	PFAS (1633)
Matrix Type:					Soil	Soil	Soil	Soil	Soil	Soil
A	L2428224	4/25/25	5/16/25	Category B						1
B	L2428227	4/25/25	5/16/25	Category B	1	1	2	1	1	
C	L2428534	4/25/25	5/16/25	Category B	1	1	1	1	1	
D	L2428535	4/25/25	5/16/25	Category B						1
E	L2428918	4/25/25	5/16/25	Category B	1	1	1	1	1	
F	L2428941	4/25/25	5/16/25	Category B						1
G	L2429225	4/25/25	5/16/25	Category B	1	1	1	1	1	
H	L2429497	4/25/25	5/16/25	Category B						1
I	L2430766	4/25/25	5/16/25	Category B			1			
J	L2430776	4/25/25	5/16/25	Category B			1			
K	L2430854	4/25/25	5/16/25	Category B						
L	L2431675	4/25/25	5/16/25	Category B			1			
M	L2432392	4/25/25	5/16/25	Category B	1	1	2	1	2	
N	L2432791	4/25/25	5/16/25	Category B	1	1	2	1	2	
O	L2433398	4/25/25	5/16/25	Category B	1	1	2	1	2	
P	L2433786	4/25/25	5/16/25	Category B	1	1	2	1	2	
Q	L2433800	4/25/25	5/16/25	Category B						1
R	L2434058	4/25/25	5/16/25	Category B	1	1	2	1	2	
S	L2434335	4/25/25	5/16/25	Category B	1	1	2	1	2	
T	L2434640	4/25/25	5/16/25	Category B	1	1	2	1	2	
U	L2434763	4/25/25	5/16/25	Category B			1			
V	L2435023	4/25/25	5/16/25	Category B	1	1	2	1	2	
W	L2435284	4/25/25	5/16/25	Category B			1			
X	L2435399	4/25/25	5/16/25	Category B	1	1	2	1	2	
Y	L2435512	4/25/25	5/16/25	Category B			1			
Z	L2435567	4/25/25	5/16/25	Category B	1	1	2	1	2	
Total			PM: PG		**14**	**14**	**31**	**14**	**24**	**5**

Sample counts do not include MS, MSD, DUP
EDD: EQuIS
NYDUSR
WO 20250422
Project# CV04.001.005

V:\LOGIN\Terraphase\Elmwood Preserve\60943ST

LDC #60943 (Terraphase - Portsmouth, NH / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	Metals (6010D)	Mercury (7471B)	Cyanide (9010C/9012B)	Cr(VI) (7196A)
Matrix Type:					Soil	Soil	Soil	Soil
A	L2428224	4/25/25	5/16/25	Category B				
B	L2428227	4/25/25	5/16/25	Category B	2	2	3	2
C	L2428534	4/25/25	5/16/25	Category B	1	1	1	1
D	L2428535	4/25/25	5/16/25	Category B				
E	L2428918	4/25/25	5/16/25	Category B	1	1	1	1
F	L2428941	4/25/25	5/16/25	Category B				
G	L2429225	4/25/25	5/16/25	Category B	1	1	1	1
H	L2429497	4/25/25	5/16/25	Category B				
I	L2430766	4/25/25	5/16/25	Category B	1	1		
J	L2430776	4/25/25	5/16/25	Category B	1	1		
K	L2430854	4/25/25	5/16/25	Category B	2	1		
L	L2431675	4/25/25	5/16/25	Category B	1	1		
M	L2432392	4/25/25	5/16/25	Category B	2	2	1	2
N	L2432791	4/25/25	5/16/25	Category B	2	2	2	2
O	L2433398	4/25/25	5/16/25	Category B	2	2	1	2
P	L2433786	4/25/25	5/16/25	Category B	2	2	1	2
Q	L2433800	4/25/25	5/16/25	Category B				
R	L2434058	4/25/25	5/16/25	Category B	2	2	1	2
S	L2434335	4/25/25	5/16/25	Category B	2	2	1	2
T	L2434640	4/25/25	5/16/25	Category B	2	2	1	2
U	L2434763	4/25/25	5/16/25	Category B	1	1		
V	L2435023	4/25/25	5/16/25	Category B	2	2	1	2
W	L2435284	4/25/25	5/16/25	Category B	1	1		
X	L2435399	4/25/25	5/16/25	Category B	2	2	1	2
Y	L2435512	4/25/25	5/16/25	Category B	1	1		
Z	L2435567	4/25/25	5/16/25	Category B	2	2	1	2
Total			PM: PG		**33**	**32**	**17**	**25**

Sample counts do not include MS, MSD, DUP
EDD: EQuIS
NYDUSR
WO 20250422
Project# CV04.001.005

V:\LOGIN\Terraphase\Elmwood Preserve\60943ST

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428224
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 2, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I1-0.2-2-P	L2428224-07	PFAS

Associated QC Samples(s):

Field/Trip Blanks: FB_05212024_P
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 21, 2024 and was analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.
The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_05212024_P for PFAS analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_05212024_P	Perfluorobutanoic acid (PFBA)	1.07 ng/L	RL	I1-0.2-2-P

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
I1-0.2-2-P	Perfluorobutanoic acid (PFBA)	0.073 ng/g	0.798U ng/g

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All extracted internal standard percent recoveries (%R) were within QC limits with the following exceptions:

Sample	Internal Standard	%R (20-150)	Affected Analyte	Validation Action
I1-0.2-2-P	M2-8:2 FTS	189	1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)	None
	D3-NMEFOSAA	163	N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	
	D5-NETFOSAA	158	N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	

No data were qualified due to high %Rs when the associated results were non-detected.

All non-extracted internal standard areas and retention times were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

All target analyte ion ratios met validation criteria with the following exceptions:

Sample	Analyte	Ion Ratio (Limits)	Validation Action
I1-0.2-2-P	Perfluorododecanoic acid (PFDoA)	0.260 (0.0845-0.2535)	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943A
SDG #: L2428224
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EF
2nd Reviewer: CF

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	LC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	A/Δ	%RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration/ISC/~~Bile Salt~~	Δ	CCV ≤ 30 ISC ≤ 30
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB = FB-05212024-P
VII	Matrix spike/Matrix spike duplicates	N	MS>
VIII	Laboratory Control Sample	A	LCS>
IX	Field Duplicate	N	
X	Internal standards	SW	
XI	Target Analyte Quantitation	Δ	Result < RL > MDL = Jdet
XII	Target Analyte Identification	SW	
XIII	Overall Assessment of Data	Δ	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I1-0.2-2-P	L2428224-07		Soil	05/21/2024	Category B

Notes:

WG1930542-1		

LDC #: 60943A

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: FR

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			✓	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?			✓	
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were the retention time windows properly established?	✓			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	✓			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	✓			
Were all the retention times within the acceptance windows?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?			✓	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) ~~between 20-150%?~~ with lab limits	✓			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	✓			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	✓			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	✓			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	✓			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
Were ion ratios between 50-150%?		✓		
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFAS

A. Perfluorobutanoic acid (PFBA)	X. NMeFOSA	UU. N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
B. Perfluoropentanoic acid (PFPeA)	Y. NEtFOSA	VV. Hexafluoropropylene oxide dimer acid (HFPO-DA)
C. Perfluorohexanoic acid (PFHxA)	Z. NMeFOSAA	WW. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
D. Perfluoroheptanoic acid (PFHpA)	AA. NEtFOSAA	XX. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
E. Perfluorooctanoic acid (PFOA)	BB. NMeFOSE	YY. 1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)
F. Perfluorononanoic acid (PFNA)	CC. NEtFOSE	ZZ. 1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)
G. Perfluorodecanoic acid (PFDA)	DD. HFPO-DA (GenX)	A1. 1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)
H. Perfluoroundecanoic acid (PFUnA)	EE. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	B1. N-ethylperfluorooctane sulfonamide (NEtFOSA)
I. Perfluorododecanoic acid (PFDoA)	FF. Perfluoro-4-methoxybutanoic acid (PFMBA)	C1. N-methylperfluorooctane sulfonamide (NMeFOSA)
J. Perfluorotridecanoic acid (PFTrDA)	GG. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	D1. N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)
K. Perfluorotetradecanoic acid (PFTeDA)	HH. Perfluoro-3-methoxypropanoic acid (PFMPA)	E1. N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)
L. Perfluorobutanesulfonic acid (PFBS)	II. 9Cl-PF3ONS	F1. 3-Perfluoropropyl propanoic acid (3:3FTCA)
M. Perfluoropentanesulfonic acid (PFPeS)	JJ. 11Cl-PF3OUdS	G1. 3-Perfluoropentylpropanoic acid (5:3FTCA)
N. Perfluorohexanesulfonic acid (PFHxS)	KK. Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	H1. 3-Perfluoroheptyl propanoic acid (7:3FTCA)
O. Perfluoroheptanesulfonic acid (PFHpS)	LL. 3:3 FTCA	
P. Perfluorooctanesulfonic acid (PFOS)	MM. 5:3 FTCA	
Q. Perfluorononanesulfonic acid (PFNS)	NN. 7:3 FTCA	
R. Perfluorodecanesulfonic acid (PFDS)	OO. 3:3 Fluorotelomer carboxylate (3:3 FTCA)	
S. Perfluorododecanesulfonic acid (PFDoS)	PP. 5:3 Fluorotelomer carboxylate (5:3 FTCA)	
T. 4:2 FTS	QQ. 7:3 Fluorotelomer carboxylate (7:3 FTCA)	
U. 6:2 FTS	RR. Perfluorooctadecanoic acid (PFODA)	
V. 8:2 FTS	SS. Perfluorohexadecanoic acid (PFHxDA)	
W. Perfluorooctanesulfonamide (PFOSA)	TT. N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

LDC #: 60943A

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Sampling date: 3/21/24 Aqs. sample unit = ng/g Associated samples: All ~~FB~~

Analyte	Blank ID (ng/L)	Sample Identification				
	FB		1			
A	1.07		0.073 / 0.7984			

VALIDATION FINDINGS WORKSHEET
Extracted Internal Standards

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

#	Sample ID	Internal Standard	%R	%R Limits	Associated Analytes	Qualifications
	1	M2-8:2FTS)	189	20-150	A1	Jdet/P ND
		(D3-NMEFOSAA)	163	20-150	TT	Jdet/P ND
		(D5-NETFOSAA)	158	20-150	UU	Jdet/P ND

60943 Δ

LDC#: ~~60490A~~

VALIDATION FINDINGS WORKSHEET
Target Analyte Identification

Reviewer: FT

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Sample ID	Analyte	Ion Ratio outside limit: Ion Ratio (Limit)	Qualification
1	I	0.260 (0.0845- 0.2535)	Jdet/P

LDC #:60943A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: LCMS EPA Method 1633

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 2.32/2.5 std)	Recalculated (RRF 2.32/2.5 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL LCMS07	5/13/2024	PFOS	1.040	1.040	1.023	1.023	6.07	6.07
			PFOA	0.940	0.940	0.912	0.912	7.10	7.10

LDC #: 60943 A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: ___ of ___
Reviewer: _____

METHOD:
LC/MS/MSEPA Draft Method 1633
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	~~Amt~~ ~~Average~~ RRF (initial)	Reported Amt RRF	Recalculated Amt RRF	Reported %R	Recalculated %R
1	CCV	6/6/24	PFOA ($^{13}C_8$-PFOA)	2.500	2.652	2.652	106.1	106.1
	LCMS07	1950	PFOS ($^{13}C_8$-PFOS)	2.320	2.370	2.370	102.1	102.1
2			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
3			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
4			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
5			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943 A

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: _____

Method:
EPA Draft Method 1633
The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: WG1930542 - 3

Compound	Spike Added (ng/g)		Spike Concentration (ng/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2.0	NA	2.29	NA	114	114				
PFOS	1.86	↓	2.21	↓	119	119				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943 A

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: ___ of ___
Reviewer: _____

Method:
LC/MS/MS EPA Draft Method 1633

The concentration of the sample was calculated for the compound identified below using the following calculation:

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example: #1

Sample I.D. _____, PFOS:

Conc. = $\frac{(124719)(2.4)(4)}{(317087)(1.023)(6.75)(0.74}$

= 0.738 ng/g

#	Sample ID	Analyte	Reported Concentration (ng/g)	Calculated Concentration (ng/g)	Qualification
	#1	PFOS	~~0.090~~ 0.734	0.738	-

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428227
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I8_6-8	L2428227-14	VOC, SVOC, Pesticide, PCB, Herbicide
I1_0-0.2	L2428227-15	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: TB_05212024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 21, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
03/22/24	ICV-VOAIII	Dichlorodifluoromethane	32.8	I8_6-8	UJ (all non-detects)
		Carbon disulfide	32.1		UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/23/24	CCV-VOAIII	Dichlorodifluoromethane	33.8	I8_6-8	UJ (all non-detects)
		Vinyl chloride	22.7		UJ (all non-detects)
		Bromomethane	29.3		UJ (all non-detects)
		Trichlorofluoromethane	25.3		UJ (all non-detects)
		Vinyl acetate	24.1		UJ (all non-detects)
		2-Butanone	21.9		UJ (all non-detects)
		Hexachlorobutadiene	27.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/25/24	CCV-SV103	2,4-Dimethylphenol	32.8	I8_6-8	UJ (all non-detects)
		2-Nitrophenol	21		UJ (all non-detects)
		Hexachlorocyclopentadiene	44.1		UJ (all non-detects)
		2,4-Dinitrophenol	27.8		UJ (all non-detects)
		Bis(2-ethylhexyl)phthalate	25.5		UJ (all non-detects)
		Di-n-octylphthalate	30.3		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
05/27/24	WG1926149-1	2	Methoxychlor	21.8	I8_6-8 I1_0-0.2	UJ (all non-detects)
05/27/24	WG1926149-1	1	Toxaphene	22.2	I8_6-8 I1_0-0.2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was not detected in the method blanks.

No positive results were found in the trip blank sample TB_05212024 for VOC analysis.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

Surrogates were added to all samples as required by the methods. All surrogate recoveries (%R) were within QC limits.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1925583-LCS/LCSD (I8_6-8)	Vinyl acetate	-	69 (70-130)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1924758-LCS/LCSD (I8_6-8)	1,4-Dioxane	38 (40-140)	39 (40-140)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Internal Standards

VOC, SVOC

All internal standard areas and retention times were within QC limits.

Pesticide, PCB, Herbicide

All internal standard percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
I1_0-0.2	cis-Chlordane	68	J (all detects)
	trans-Chlordane	113	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FT
2nd Reviewer: CT

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	GC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	A/SW	%RSD ≤ 20, r ≥ 0.99 ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	Δ	
VI	Field Blank	ND	TB = TB_05212024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	cs
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NJ Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8	L2428227-14		Soil	05/21/2024	Category B

Notes:

WG1925538-5	VOA III	
19		

HHHH - linear

LDC #: 60943B

VALIDATION FINDINGS CHECKLIST

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20% and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30%?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: F7

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	3/22/24	ICV-VOA111	JJ	32.8	All	J/UJ/A ND
	0221		G	32.1	↓	↓

	DOD	NFG
%D	20%	30%

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/23/24 20:22	CCV-VOA111	JJ	33.8		All	J/UJ/A all ND
			C	22.7		↓	↓
			B	29.3			
			KK	25.3			
			HH	24.1			
			M	21.9		↓	↓
			LLL	27.1		↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1925583-2 LCS ID	HH		69	70-130			All	J/UJ/P ND

LDC #:60943B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	3/21/2024	F	0.081	0.081	0.086	0.086	7.02	7.02
	VOA 111		CC	0.806	0.806	0.819	0.819	8.33	8.33
			BB	0.720	0.720	0.705	0.705	7.04	7.04

LDC # 60943

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV	5/23/24 2022	F	0.086	0.070	0.070	18.6	18.6
			CC	0.819	0.894	0.894	9.2	9.2
			BB	0.705	0.722	0.722	2.4	2.4

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane 4	20.0	22.214	111	111	0
1,2-Dichloroethane-d4 1	↓	24.456	122	122	↓
Toluene-d8 2		20.026	100	100	
4-Bromofluorobenzene 3		18.658	93	93	

LDC # 60943

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG192 5538 - LCS ID

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	44.402	44.647	111	111	112	112	1	0.55
Trichloroethene			45.463	45.385	114	114	114	114	0	0.172
Benzene			44.863	44.726	112	112	112	112	0	0.310
Toluene			43.668	43.670	109	109	109	109	0	0
Chlorobenzene			41.582	41.654	104	104	104	104	0	0.173

LDC #: 60943

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF
VS

Where:
Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(4191)(20)(5)}{(102205)(0.086)(5.5)(0.79)}$

= 10.974 ug/kg

5.5g %s = 79

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	F	10.974 ≈ 11	11 U	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FM
2nd Reviewer: CP

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20 r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	cs
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8	L2428227-14		Soil	05/21/2024	Category B

Notes:

WG1924758-1		

LDC #: 60943 B

VALIDATION FINDINGS CHECKLIST

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/25/24	CCV-SV103	O	32.8		All - MB1	J/UJ/A ND
	0623		N	21			
			X	44.1			
			HH	27.8			
			EEE	25.5			
			FFF	30.3			
	5/23/24	CCV-BUFFY	QQQ	24.4		MB1	J/UJ/A ND
	1055		N	38.1			
			BB	24.2			
			II	22.9			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1924758-1 LCS/D	III	38	39	40-140			All	J/UJ/P ND

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV103	12/17/2023	A	1.647	1.647	1.654	1.654	2.74	2.74
			S	1.018	1.018	1.031	1.031	2.34	2.34
			GG	1.065	1.065	1.111	1.111	4.74	4.74
			UU	1.079	1.079	1.093	1.093	3.08	3.08
			DDD	1.272	1.272	1.246	1.246	5.29	5.29
			JJJ	0.985	0.985	1.019	1.019	6.42	6.42

LDC # 60943B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV SV103	5/25/24 0600 0623	A	1.654	1.585	1.585	4.2	4.2
			S	1.031	1.019	1.019	1.2	1.2
			GG	1.111	1.081	1.081	2.7	2.7
			HH	1.093	1.052	1.052	3.8	3.8
			DDD	1.246	1.285	1.285	3.1	3.1
			JJJ	1.019	1.036	1.036	1.7	1.7

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	18.879	76	76	0
2-Fluorobiphenyl	↓	17.943	72	72	
Terphenyl-d14	↓	13.656	55	55	↓
Phenol-d5	50.0	38.851	78	78	↓
2-Fluorophenol	↓	40.572	81	81	↓
2,4,6-Tribromophenol	↓	30.528	61	61	↓

LDC # 60943B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1924758-2/3

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	25.141	24.220	63	63	60	61	5	3.7
N-Nitroso-di-n-propylamine	↓	↓	25.096	23.003	63	63	58	58	3	8.7
4-Chloro-3-methylphenol			25.885	24.768	65	65	62	62	5	4.4
Acenaphthene			20.318	20.013	51	51	50	50	2	1.5
Pentachlorophenol			23.570	22.090	59	59	55	55	7	6.5
Pyrene			22.237	22.332	56	56	56	56	0	0.4

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

WG1924758 - LCS (A)

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

$$\text{Concentration} = \frac{(300839)\ (40.0)\ (1)\ (1000)}{(350135)\ (1.367)\ (30.51)}$$

$$= 824\ ug/kg$$

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	A	824 ≈ 820	820	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r² ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL<samples<RL, Jdet/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8	L2428227-14		Soil	05/21/2024	Category B
2	I1_0-0.2	L2428227-15		Soil	05/21/2024	Category B

Notes:

1 WG1925205-7		

Method: ~~PCBs~~ Pesticides (EPA SW 846 Method ~~8082~~ 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	05/27/24	WG1926149-1	2	Methoxychlor	21.8	ALL, MB1 (ND)	J/UJ/A
			1	toxaphene	22.2	↓	↓

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2 (DET)	cis-Chlordane	68	JDET/A
		trans-Chlordane	113	

Comments:_____

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	5/14/2024	Dieldrin (CLP1)	1.116	1.116	1.227	1.227	9.49	9.48
			Dieldrin (CLP2)	1.047	1.047	1.122	1.122	7.11	7.09
			4,4'-DDE (CLP1)	1.107	1.107	1.213	1.213	7.95	7.94
			4,4'-DDE (CLP2)	1.083	1.084	1.143	1.143	5.45	5.45

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1926149-1	05/27/24	Dieldrin (CLP1)	1.227	1.203	1.203	2.0	2.0
			Dieldrin (CLP2)	1.122	1.130	1.130	0.7	0.7
			4,4'-DDE (CLP1)	1.213	1.034	1.034	14.8	14.8
			4,4'-DDE (CLP2)	1.143	1.046	1.046	8.5	8.5

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	39.037	78	78	0
Tetrachloro-m- xylene	RTX-CLP2	50	41.673	83	83	0
Decachlorobiphenyl	RTX-CLP1	50	32.990	66	66	0
Decachlorobiphenyl	RTX-CLP2	50	36.079	72	72	0

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1925205-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	33.00	31.60	36.80	35.60	111	112	113	113	2	1
4,4'-DDD	33.00	31.60	40.30	38.80	122	122	123	123	1	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/kg)	Reported Conc. (ug/kg)	% Diff
2	4,4'-DDE	3.178E+08	5.505E+07	25	1.213	10.00	15.76	1.00	71	**106**	**107**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MQ
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8	L2428227-14		Soil	05/21/2024	Category B

Notes:

1 WG1925234-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST7	2/5/2024	1260-1 (CLP1)	0.078	0.078	0.074	0.074	17.16	17.45
			1260-1 (CLP2)	0.073	0.073	0.071	0.071	13.25	13.12

LDC#: 60943B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

Where:

ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

Ax = Area of compound,

Cx = Concentration of compound,

Ais = Area of associated internal standard

Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1925394-2 PEST 7	05/24/24	1260-1 (CLP1)	0.074	0.067	0.067	9.5	9.5
			1260-1 (CLP2)	0.071	0.072	0.072	1.4	1.4

LDC # _60943B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	356.140	71	71	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	372.743	75	75	0
Decachlorobiphenyl	RTX-CLP1	500.00	426.362	85	85	0
Decachlorobiphenyl	RTX-CLP2	500.00	419.700	84	84	0

LDC # _60943B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1925234-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	303	298	208	202	69	69	68	68	1	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	4.024E+08	677900000	250	0.074	5.00	10.30	1.00	N/A	**2005.398**	2008.455	0
WG1925234-2												
	1260-Total =	(2008.455+2076.352+2146.998+2232.933+2265.197)						conc =	(2146)(5mL)		**final conc**	
			5						(10.30g) (5mL)		**(ug/Kg)**	
	=	2145.99						=	**208.3**		208	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8	L2428227-14		Soil	05/21/2024	Category B

Notes:

1 WG1925999-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1926317-2	05/28/24	2,4-D (CLP1)	0.240	0.247	0.247	2.9	2.9
			2,4-D (CLP2)	0.237	0.272	0.272	14.8	14.6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.390	78	78	0
DCAA	RTX-CLP2	0.500	0.402	80	80	0

LDC# 60943B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1925999-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	163	109	124	67	67	76	76	13	13

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	2.641E+08	8.185E+08	0.250	0.240	1.00	30.73	1.00	NA	**109**	**109**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428227
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I8_6-8	L2428227-14	Metals, Wet Chemistry
I1_0-0.2	L2428227-15	Metals, Wet Chemistry
I8_6-8MS	L2428227-14MS	Wet Chemistry
I8_6-8MSD	L2428227-14MSD	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 21, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Chromium	0.047 mg/Kg	0.400 mg/Kg	I8_6-8
	Iron	1.16 mg/Kg	5.80 mg/Kg	I1_0-0.2
ICB/CCB	Arsenic	0.00415 mg/L	0.830 mg/Kg	I8_6-8
	Iron	0.022 mg/L	4.40 mg/Kg	I1_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Wet Chemistry

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Metals

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I8_6-8 I1_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: WF
2nd Reviewer: [signature]

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	~~A~~ SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8 2x, all except Hg (matrix)	L2428227-14		Soil	05/21/2024	Category B
2	I1_0-0.2	L2428227-15		Soil	05/21/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Chromium	0.047		0.400					
Iron	1.16		5.80					
Arsenic		0.00415	0.830					
Iron		0.022	4.40					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

Calibration Calculation Verification

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	As	0.458	0.500	91.6	92	Y
CCV	ICP	Fe	0.534	0.500	106.8	107	Y
LLCC	ICP						
ICSAB	ICP	Mg	481	500	96.2	96	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.0103	0.0100	103	103	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1926284 LCS	LCS	Mn	42.7	40.0	106.75	107	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Ca	143.9076	2	1.257	50	79	14400	14491.76762	Y
2	Pb	1.327	2	1.27	50	71	148	147.1664633	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943B
SDG #: L2428227
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: [signature]

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<ND samples<RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I8_6-8	L2428227-14		Soil	05/21/2024	Category B
2	I1_0-0.2	L2428227-15		Soil	05/21/2024	Category B
3	I8_6-8MS	L2428227-14MS	MS	Soil	05/21/2024	Category B
4	I8_6-8MSD	L2428227-14MSD	MSD	Soil	05/21/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)
QC	
3-4	CN-

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.

Calibration date:

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	5.35993	5.00		107.1986	107	Y
Calibration verification	Cr(VI)				#DIV/0!		---
Calibration verification	CN-	5.35514	5.00		107.1028	107	Y

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1926520 LCS	LCS	Cr(VI)	157	192	81.77083333	82	Y
3	MS	CN-	12	12	100	100	Y
4	Duplicate	CN-	110	100	9.523809524	10	Y

*Lab calculated RPD using %R's

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	-0.11153	1	1.0353	50	79	1.2 U	-0.136363581	Y
2	Cr(VI)	0.00	1	2.5568	100	71	1.13 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428534
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I15_6-8	L2428534-12	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_05222024, FB_05222024
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 22, 2024 and was analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
03/26/24	ICAL-VOA127	1,4-Dioxane	0.00297 (≥0.005)	I15_6-8	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
03/27/24	ICV-VOA127	Dichlorodifluoromethane	38.3	I15_6-8	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/26/24	CCV-VOA127	1,2-Dibromo-3-chloropropane	22.5	I15_6-8	UJ (all non-detects)
		Dichlorodifluoromethane	41.4		UJ (all non-detects)
		Chloromethane	40		UJ (all non-detects)
		Vinyl chloride	20.2		UJ (all non-detects)
		2,2-Dichloropropane	20.1		UJ (all non-detects)
		1,4-Dioxane	29.6		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/26/24	CCV-VOA127	1,4-Dioxane	0.00209 (≥0.005)	I15_6-8	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/29/24	CCV-GCMS5	Phenol	20.2	I15_6-8	UJ (all non-detects)
		Bis(2-chloroisopropyl) ether	38.9		UJ (all non-detects)
		2-Nitrophenol	23.3		UJ (all non-detects)
		2,6-Dinitrotoluene	20.8		UJ (all non-detects)
		2,4-Dinitrophenol	29.5		UJ (all non-detects)
		4,6-Dinitro-o-cresol	26.6		UJ (all non-detects)
		Pentachlorophenol	30		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
05/28/24	WG1926351-4	1	Toxaphene	20.7	I15_6-8	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1926357-5	Chloroform	0.73 ug/Kg	RL	I15_6-8
	Unknown (0.97)	7.8 ug/Kg	RL	
	Unknown (1.64)	2.57 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect.

No positive results were found in the trip blank sample TB_05222024 and field blank sample FB_05222024 for VOC analysis.

SVOC

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_05222024 for SVOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_05222024	Benzyl alcohol	0.50 ug/L	RL	I15_6-8

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect.

Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_05222024 for pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC, SVOC, PCB, Herbicide

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were not within QC limits. No data were qualified since there were no associated samples in this SDG. Relative percent differences (RPD) were within QC limits.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1926357-314 (I15 6-8)	Chloromethane	140 (52-130)	-	None

No data were qualified due to high %R when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the SVOC, pesticide, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EM
2nd Reviewer: EM

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	FB= FB_05222024
VII	Surrogate Spikes	A	TB= TB_05222024
VIII	Matrix Spike/Matrix Spike Duplicate	N	MS
IX	Laboratory Control Sample	SW	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = J/UJ
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8	L2428534-~~11~~ 12		Soil	05/22/2024	Category B

Notes:

HG1926357-5		

S,M

LDC #: 60943C

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20% and relative response factors (RRF) ≥ 0.05?		✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	3/26/24	ICAL - VOA 127	HHHH		0.00297 (≥ 0.005)	All	J/UJ/A ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	3/26/24 27 @ 0422	ICV - VOA127	JJ	38.3	All	J/UJ/A ND

	DOD	NFG
%D	20%	30%

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/26/24 1425	CCV - VOA 127	MM	22.5		All	J/UJ/A NY
			JJ	41.4			
			A	40.			
			C	20.2			
			EE	20.1			
			HHHH	29.6			
			HHHH		0.00209 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 5/26/24 **Associated samples:** All
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1		1						
K	0.73		-						
TIC Unknown	7.8 (0.97)		8.06 (0.97)						
↓	2.57 (1.64)		-						

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1926357 -3|4	A	140		52-130			All	Idet /p ND

LDC #:60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	3/26/2024	A	0.285	0.285	0.295	0.295	12.60	12.60
	VOA127		CC	0.736	0.736	0.766	0.766	11.62	11.62
			BB	0.617	0.617	0.684	0.684	7.03	7.03

LDC # 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA127	5/26/24 1425	A	0.295	0.413	0.413	40	40
			CC	0.766	0.817	0.817	6.7	6.7
			BB	0.684	0.621	0.621	9.2	9.2

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	18.037	90	90	0
1,2-Dichloroethane-d4	↓	19.491	97	97	↓
Toluene-d8		18.723	94	94	
4-Bromofluorobenzene		18.628	93	93	

LDC # 609430

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG192635 7 - LCS ID

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	37.68	36.39	94	94	91	91	3	3.5
Trichloroethene			45.211	46.61	113	113	116	116	3	3.0
Benzene			45.087	45.431	113	113	114	114	1	0.76
Toluene			42.652	41.215	107	107	103	103	4	3.43
Chlorobenzene			42.367	41.494	106	106	104	104	2	2.08

LDC #: 60943

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc *Vp*DF}}{\text{VS}}$

#1 cc

Concentration = $\frac{(4146)\ (20)\ (5)}{(168\,599)\ (0.766\ \ 16.3)(0.8}$

= 0.592 ug/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	cc	0.592	0.59	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA
Method: Semivolatiles (EPA 8270E) + TICs

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB = FB-05222024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	cs
IX	Laboratory Control Sample	A	LCSID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8	L2428534-11 12		Soil	05/22/2024	Category B

Notes:

WG1925954-1		

LDC #: 60943C

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/29/24 0009	CCV-GCMS5	A	20.2		All - MB1	J/UJ/A all ND
			MMM	38.9			
			N	23.3			
			EE	20.8			
			HH	29.5			
			4,6-Dinitro-o-cresol	26.6			
			TT	30			
	5/28/24 2224	CCV-MORK	MMM	22		MB1	J/UJ/A ND

	DOD	NFG		
%D	20%/50%	20%	RRF: 0.001 - poor performers	0.05 - all other analytes

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Field Blanks

FB = FB-05222024

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 5/22 **Blank units:** ug/L **Associated sample units:** ug/kg
Field blank type: FB **Associated Samples:** All (ND)

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB								
QQQ	0.50								

Sampling date: _____ **Blank units:** _____ **Associated sample units:** _____
Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

LDC #:60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL GCMS5	2/6/2024	A	1.473	1.473	1.477	1.477	2.38	2.38
			S	1.059	1.059	1.053	1.053	6.78	6.78
			GG	1.077	1.077	1.070	1.070	4.77	4.77
			UU	1.064	1.064	1.076	1.076	7.84	7.84
			DDD	1.272	1.272	1.275	1.275	9.27	9.27
			JJJ	1.160	1.160	1.186	1.186	7.70	7.70

LDC # 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal stanc
Cis = Concentration of internal standa

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV GCMS5	5/29/24 0009	A	1.477	1.178	1.178	20.2	20.2
			S	1.053	0.942	0.942	10.5	10.5
			GG	1.070	0.966	0.966	9.7	9.7
			HH	1.076	0.932	0.932	13.4	13.4
			DDD	1.275	1.125	1.125	11.8	11.8
			JJJ	1.186	1.15	1.15	3	3

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943C

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/ml	Surrogate Found (ug/ml	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	17.516	70	70	0
2-Fluorobiphenyl		20.149	81	81	
Terphenyl-d14	↓	21.503	86	86	↓
Phenol-d5	50.0	34.529	69	69	
2-Fluorophenol		34.924	70	70	
2,4,6-Tribromophenol	↓	54.592	109	109	↓

LDC # 60943C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG192594 - 3/4

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	35.006	31.193	88	88	78	78	12	11.5
N-Nitroso-di-n-propylamine			33.368	29.714	83	83	74	74	11	11.6
4-Chloro-3-methylphenol			36.972	36.579	92	92	91	91	1	1.1
Acenaphthene			36.053	34.409	90	90	86	86	5	4.7
Pentachlorophenol			37.060	35.235	93	93	88	88	6	5.0
Pyrene			37.302	36.013	93	93	90	90	3	3.5

LDC #: 60943C

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

WG192595 4- LCS (GG)

Concentration = $\frac{(171112)(40.0)(1)(1000)}{(193823)(0.979)(30.39)}$

= 1186.9 ng/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ng/kg)	Reported Concentration (ng/kg)	% Diff
LCS	GG	1186.9 ≠ 1200	1200 J	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A /A	
II	Initial Calibration/ ICV	A /A	RSD≤20%. r^2 ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-05222024 from same SDG
VI	Surrogate Spikes /IS	A /A	
VII	Matrix Spike/Matrix Spike Duplicate	SW	%R out, No Qual, no assoc. samples
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8	L2428534-12		Soil	05/22/2024	Category B

Notes:

1 WG1925833-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	5/28/24	WG1926351-4	1	Toxaphene	20.7	ALL, MB1 (ND)	J/UJ/A

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	5/14/2024	Dieldrin (CLP1)	1.116	1.116	1.227	1.227	9.49	9.48
			Dieldrin (CLP2)	1.047	1.047	1.122	1.122	7.11	7.09
			4,4'-DDD (CLP1)	0.843	0.843	0.864	0.864	2.41	2.42
			4,4'-DDD (CLP2)	0.878	0.879	0.922	0.922	4.92	4.92

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1926149-4	05/27/24	Dieldrin (CLP1)	1.227	1.283	1.284	4.6	4.6
			Dieldrin (CLP2)	1.122	1.195	1.195	6.5	6.5
			4,4'-DDD (CLP1)	0.864	1.031	1.031	19.3	19.3
			4,4'-DDD (CLP2)	0.922	1.031	1.031	11.8	11.8

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	48.136	96	96	0
Tetrachloro-m- xylene	RTX-CLP2	50	58.540	117	117	0
Decachlorobiphenyl	RTX-CLP1	50	58.603	117	117	0
Decachlorobiphenyl	RTX-CLP2	50	73.882	148	148	0

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1925833-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	39.0	40.0	791	970.0	697.0	459	459	0	-235	3	33
4,4'-DDD	39.0	40.0	0	32.8	27.4	84	84	69	69	18	18

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1925833-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.90	32.20	32.90	33.20	100	100	103	103	3	3
4,4'-DDD	32.90	32.20	36.90	37.80	112	112	117	117	4	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS WG1925833-2	Dieldrin	1.292E+08	5.263E+07	25	1.227	10.00	15.19	1.00	N/A	**32.9**	**32.9**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MJ
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%
III	Continuing Calibration	A	Y.D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-05222024 from same SDG
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCSID
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results < PL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8	L2428534-~~11~~ 12		Soil	05/22/2024	Category B

Notes:

1 WG1925955-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest 23	8/25/2023	1260-1 (CLP1)	0.067	0.067	0.062	0.062	15.68	15.72
			1260-1 (CLP2)	0.057	0.057	0.053	0.053	12.18	12.22

LDC#: 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1926389-1	05/28/24	1260-1 (CLP1)	0.062	0.055	0.055	11.3	11.5
			1260-1 (CLP2)	0.053	0.052	0.052	1.9	1.9

LDC # _60943C

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	299.541	60	60	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	320.386	64	64	0
Decachlorobiphenyl	RTX-CLP1	500.00	371.056	74	74	0
Decachlorobiphenyl	RTX-CLP2	500.00	405.945	81	81	0

LDC # _60943C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1925958-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	296	308	208	204	70	70	66	66	6	6

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	4.151E+08	792400000	250	0.062	5.00	10.60	1.00	N/A	**2107.449**	2102.000	0
WG1925958-2												
	1260-Total =	(2102.000+2169.369+2136.612+2258.277+2312.611)						conc =	(2196)(5mL)		**final conc**	
			5						(10.60g) (5mL)		**(ug/Kg)**	
	=	2195.77						=	**207**		207	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB_05222024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8	L2428534-12		Soil	05/22/2024	Category B

Notes:

1 WG1925999-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1926317-3	05/28/24	2,4-D (CLP1)	0.240	0.252	0.252	5.0	5.0
			2,4-D (CLP2)	0.237	0.272	0.272	14.8	14.6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.419	84	84	0
DCAA	RTX-CLP2	0.500	0.430	86	86	0

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1925999-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	201	198	0	162	184	81	81	93	93	13	13

LDC# 60943C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1925999-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	163	109	124	67	67	76	76	13	13

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	2.641E+08	8.185E+08	0.250	0.240	1.00	30.73	1.00	NA	**109**	**109**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428534
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I15_6-8	L2428534-12	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-05222024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 22, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.986 mg/Kg	4.930 mg/Kg	I15_6-8

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB-05222024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-05222024	Arsenic	0.00024 mg/L	0.0012 mg/Kg	I15_6-8

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-05222024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
G12_0-0.2 MS/MSD (I15_6-8)	Lead	-	74 (75-125)	J (all detects) UJ (all non-detects)
	Mercury	124 (80-120)	75 (80-120)	J (all detects) UJ (all non-detects)

For G12_0-0.2 MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
G12_0-0.2 MS/MSD (I15_6-8)	Mercury	22 (≤20)	UJ (all non-detects)

Wet Chemistry

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I15_6-8	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW ~~N~~	FB= FB-05222024
VII	Matrix Spike/Matrix Spike Duplicate	SW	G12-0-0.2 MS/MSD
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A ~~N~~	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<Sample<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8 2x, all except Hg (matrix)	L2428534~~F~~ - 12		Soil	05/22/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level (mg/kg)**					
Iron	0.986		4.930					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 05/22/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB-05222024							
Arsenic	0.00024	0.0012						

Comments: The action level, when applicable, is establised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943C_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
G12_0-0.2 MS/MSD	soil	Lead		74	75-125			All	J/UJ/A	Det
		Mercury	124	75	80-120			All	J/UJ/A	ND
G12_0-0.2 MS/MSD	soil	Mercury				22	20	All	J/UJ/A	ND

Comments: **G12_0-0.2 MS/MSD: multiple analytes >4x, %R**

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Cr	0.479	0.500	95.8	96	Y
CCV	ICP	Se	0.47	0.500	94	94	Y
LLCC	ICP						
ICSAB	ICP	Ca	497	500	99.4	99	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0031	0.0030	103.3333333	102	Y
CCV	CVAA	Hg	0.0053	0.0050	106	106	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1926606 LCS	LCS	Sb	38.8	40.0	97	97	Y
G12_0-0.2 MS	MS	Ba	175.6	189	92.91005291	93	Y
G12_0-0.2 MSD	Duplicate	Mg	3180	3100	2.547770701	3	Y
G12_0-0.2 PDS	PDS	Pb	46.5	49.8	93.37349398	93	Y
G12_0-0.2 SD	Serial dilution	Fe	12100	11700	3.418803419	3	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Be	0.003	2	1.319	50	86	0.264	0.26447097	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943C
SDG #: L2428534
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NP
2nd Reviewer: CL

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-05222024
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	~~MDL < sample RL~~ MDL < no sample < RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I15_6-8	L2428534-~~11~~ - 12		Soil	05/22/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	0.00148	0.999745	0.99993	Y
		s2	0.2	0.00673			
		s3	0.5	0.01771			
		s4	1	0.03392			
		s5	2	0.0685			
		s6	5	0.17393			
		s7	10	0.3541			
		s8	25	0.93352			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10125	0.1		101.25	101	Y
Calibration verification	CN-	4.98645	5		99.729	100	Y
Calibration verification	Cr(VI)	0.214	0.2		107	107	Y

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1927531 LCS	LCS	CN-	0.101	0.100	101	101	Y
	MS						
WG1927531 LCSD	Duplicate	CN-	0.096	0.101	5.076142132	5	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.000	1	2.5047	100	86	0.926 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428535
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 2, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G12_0.2-2-P	L2428535-01	PFAS
G12_0.2-2-PMS	L2428535-01MS	PFAS
G12_0.2-2-PMSD	L2428535-01MSD	PFAS

Associated QC Samples(s):

Field/Trip Blanks:	FB_05222024_P
Field Duplicate pair:	None Associated

The above-listed soil samples were collected on May 22, 2024 and were analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard	Analyte	%D	Associated Samples	Validation Action
06/08/24	ISC	N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	47.1	G12_0.2-2-P	UJ (all non-detects)
		4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	30.5		UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_05222024_P for PFAS analysis.

MS/MSD Results

All criteria were met.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943D
SDG #: L2428535
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FT
2nd Reviewer: CL

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	LC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%R%D ≤ 20 ICV ≤ 30
IV	Continuing Calibration/ISC/~~Bile Salt~~	SW	CCV/ISC ≤ 30
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-05322024-P
VII	Matrix spike/Matrix spike duplicates	~~A~~	~~05~~
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	N	~~A~~
X	Internal standards	A	
XI	Target Analyte Quantitation	A	ND Result < RL > MDL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G12_0.2-2-P	L2428535-01		Soil	05/22/2024	Category B
2	G12_0.2-2-PMS	L2428535-01MS	MS	Soil	05/22/2024	Category B
3	G12_0.2-2-PMSD	L2428535-01MSD	MSD	Soil	05/22/2024	Category B

Notes:

WG1930996		

LDC #: 60943 17 **VALIDATION FINDINGS CHECKLIST** Page: 1 of 2
Reviewer: FT

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			✓	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?			✓	
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were the retention time windows properly established?	✓			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	✓			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?				
Were all the retention times within the acceptance windows?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?		✓		
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?			✓	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 60943D

VALIDATION FINDINGS CHECKLIST

Reviewer: EJ

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) ~~between 20-150%?~~ with lab limits	✓			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	✓			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	✓			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	✓			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	✓			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
Were ion ratios between 50-150%?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFAS

A. Perfluorobutanoic acid (PFBA)	X. NMeFOSA	UU. N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
B. Perfluoropentanoic acid (PFPeA)	Y. NEtFOSA	VV. Hexafluoropropylene oxide dimer acid (HFPO-DA)
C. Perfluorohexanoic acid (PFHxA)	Z. NMeFOSAA	WW. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
D. Perfluoroheptanoic acid (PFHpA)	AA. NEtFOSAA	XX. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
E. Perfluorooctanoic acid (PFOA)	BB. NMeFOSE	YY. 1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)
F. Perfluorononanoic acid (PFNA)	CC. NEtFOSE	ZZ. 1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)
G. Perfluorodecanoic acid (PFDA)	DD. HFPO-DA (GenX)	A1. 1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)
H. Perfluoroundecanoic acid (PFUnA)	EE. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	B1. N-ethylperfluorooctane sulfonamide (NEtFOSA)
I. Perfluorododecanoic acid (PFDoA)	FF. Perfluoro-4-methoxybutanoic acid (PFMBA)	C1. N-methylperfluorooctane sulfonamide (NMeFOSA)
J. Perfluorotridecanoic acid (PFTrDA)	GG. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	D1. N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)
K. Perfluorotetradecanoic acid (PFTeDA)	HH. Perfluoro-3-methoxypropanoic acid (PFMPA)	E1. N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)
L. Perfluorobutanesulfonic acid (PFBS)	II. 9Cl-PF3ONS	F1. 3-Perfluoropropyl propanoic acid (3:3FTCA)
M. Perfluoropentanesulfonic acid (PFPeS)	JJ. 11Cl-PF3OUdS	G1. 3-Perfluoropentylpropanoic acid (5:3FTCA)
N. Perfluorohexanesulfonic acid (PFHxS)	KK. Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	H1. 3-Perfluoroheptyl propanoic acid (7:3FTCA)
O. Perfluoroheptanesulfonic acid (PFHpS)	LL. 3:3 FTCA	
P. Perfluorooctanesulfonic acid (PFOS)	MM. 5:3 FTCA	
Q. Perfluorononanesulfonic acid (PFNS)	NN. 7:3 FTCA	
R. Perfluorodecanesulfonic acid (PFDS)	OO. 3:3 Fluorotelomer carboxylate (3:3 FTCA)	
S. Perfluorododecanesulfonic acid (PFDoS)	PP. 5:3 Fluorotelomer carboxylate (5:3 FTCA)	
T. 4:2 FTS	QQ. 7:3 Fluorotelomer carboxylate (7:3 FTCA)	
U. 6:2 FTS	RR. Perfluorooctadecanoic acid (PFODA)	
V. 8:2 FTS	SS. Perfluorohexadecanoic acid (PFHxDA)	
W. Perfluorooctanesulfonamide (PFOSA)	TT. N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

LDC #: 60943D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration/Instrument Sensitivity Check

Reviewer: FT

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Date	Standard ID	Analyte	Finding %D (Limit: ≤30.0%)	Associated Sample	Qualifications
6/8/24 1225	~~CCV Low~~ ISC	PFHxS	47.1	All	J/UJ/A
		EE	30.5	↓	J/UJ/A
					all ND

LDC #:60943D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: LCMS EPA Method 1633

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 2.32/2.5 std)	Recalculated (RRF 2.32/2.5 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	5/13/2024	PFOS	1.040	1.040	1.023	1.023	6.07	6.07
	LCMS07		PFOA	0.940	0.940	0.912	0.912	7.10	7.10

LDC #: 60943D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: ___ of ___
Reviewer: _____

METHOD:
LC/MS/MSEPA Draft Method 1633
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Amt ~~Average~~ RRF (initial)	Reported Amt RRF	Recalculated Amt RRF	Reported %D	Recalculated %D
1	CCV	6/8/24 1902	PFOA ($^{13}C_8$-PFOA)	2.50	2.495	2.495	99.8	99.8
			PFOS ($^{13}C_8$-PFOS)	2.320	2.272	2.272	97.9	97.9
2			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
3			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
4			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
5			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943D

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: _____

Method:
EPA Draft Method 1633
The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = | LCSC - LCSDC | * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: WG1930996-3 (LCS)

Compound	Spike Added (ng/g)		Spike Concentration (ng/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2.0	NA	2.43	NA	121	121				
PFOS	1.86	↓	2.05	↓	110	110	NA			

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943D

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: ___ of ___
Reviewer: _____

Method:
LC/MS/MS EPA Draft Method 1633

The concentration of the sample was calculated for the compound identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #1, PFOS

$$\text{Conc.} = \frac{(38429)(2.4)(4)}{(240695)(1023)(5.63)(0.89)}$$

$$= 0.299 \text{ ng/g}$$

LEMS07

#	Sample ID	Analyte	Reported Concentration (ng/g)	Calculated Concentration (ng/g)	Qualification
			0.299	0.299	-

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428918
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_7-9	L2428918-18	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_05232024, FB_05232024
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 23, 2024 and was analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/15/24	ICAL-VOA110	1,4-Dioxane	0.00333 (≥0.005)	A13_7-9	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/16/24	ICV-VOA110	Carbon disulfide	33.9	A13_7-9	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/28/24	CCV-VOA110	Bromomethane	24.7	A13_7-9	UJ (all non-detects)
		Methylene chloride	24		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/28/24	CCV-VOA110	1,4-Dioxane	0.00265 (≥0.005)	A13_7-9	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/30/24 (2124)	CCV-GCMS5	Phenol	23.5	A13_7-9	UJ (all non-detects)
		Bis(2-chloroisopropyl) ether	38.1		UJ (all non-detects)
		2,6-Dinitrotoluene	22		UJ (all non-detects)
		2,4-Dinitrophenol	25.9		UJ (all non-detects)
		4,6-Dinitro-o-cresol	24.8		UJ (all non-detects)
		Pentachlorophenol	26.6		UJ (all non-detects)
05/30/24 (2148)	CCV-GCMS5	1,4-Dioxane	26.8	A13_7-9	UJ (all non-detects)
		1,2,4,5-Tetrachlorobenzene	21.8		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
05/30/24	WG1927484-1	1	Methoxychlor	20.7	A13_7-9	UJ (all non-detects)
			Toxaphene	41.0		UJ (all non-detects)
05/30/24	WG1927484-1	2	gamma-Chlordane (trans)	27.5	A13_7-9	UJ (all non-detects)
			Toxaphene	64.4		UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1927115-5	Bromomethane	1.3 ug/Kg	RL	A13_7-9
	Unknown (1.56)	7.14 ug/Kg	RL	
	Unknown (2.48)	2.04 ug/Kg	RL	
	Unknown (13.14)	2.36 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte TIC (RT in minutes)	Level Detected	Validation Action
A13_7-9	Unknown (1.57)	7.26 ug/Kg	7.26U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_05232024 and field blank sample FB_05232024 for VOC analysis.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_05232024 for SVOC, pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC, SVOC, PCB, Herbicide

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were not within QC limits. No data were qualified since there were no associated samples in this SDG. Relative percent differences (RPD) were within QC limits.

LCS Results

Herbicide

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
WG1927413-2/3 (A13_7-9)	2,4-D 2,4,5-TP (Silvex)	35 (≤30) 31 (≤30)	None

No data were qualified due to high RPD when the associated results were non-detected.

VOC, SVOC, Pesticide, PCB

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the SVOC, pesticide, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FJ
2nd Reviewer: [illegible]

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	%D ≤ 20 ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	FB = FB_05232024
VII	Surrogate Spikes	A	TB = TB_05232024
VIII	Matrix Spike/Matrix Spike Duplicate	N	MS
IX	Laboratory Control Sample	A	LCS W
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = Jdet
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9	L2428918-18		Soil	05/23/2024	Category B

Notes:

S/W

WG1927115-5 Blank		

LDC #: 60943E

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20% and relative response factors (RRF) ≥ 0.05?	✓	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30%?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	5/15/24	ICAL - VOA 11D	HHHH		D. 00333 (≥ 0.005)	all	J/UJ/A (ND)

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FM

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	5/16/24	ICV-VOA 110	G	33.9	All	J/UJ/A NP
	0338					

	DOD	NFG
%D	20%	30%

LDC #: 60943 E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/28/24	ccv-voa 110	B	24.7		all	J/UJ/A ND
	0711		E	24		↓	↓
			HHHH		0.00265		
					(20.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943E

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 5/28/24 **Associated samples:** all
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1			1					
B	1.3			-					
TIC Unknown	7.14 (1.56)			7.26 (1.57)					
↓	2.04 (2.48)			-					
↓	2.36 (13.14)			-					

Blank extraction date: **Blank analysis date:** **Associated samples:**
Conc. units:

Compound	Blank ID	Sample Identification							

LDC #:60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	5/15/2024	A	0.242	0.242	0.258	0.258	16.44	16.44
	VOA110		CC	0.688	0.688	0.719	0.719	7.85	7.85
			BB	0.600	0.600	0.634	0.634	3.02	3.02

LDC # 60943 E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA 11D	5/28/24 0711	A	0.258	0.236	0.236	8.5	8.5
			CC	0.719	0.71	0.71	1.3	1.3
			BB	0.634	0.585	0.585	7.7	7.7

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943E

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.133	95	95	0
1,2-Dichloroethane-d4	↓	22.338	112	112	↓
Toluene-d8		20.538	103	103	
4-Bromofluorobenzene		20.334	102	102	

LDC # 60943 E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG192715 - lcs ID

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	34.973	32.634	87	87	82	82	6	6.8
Trichloroethene			40.931	41.231	102	102	103	103	1	0.73
Benzene			38.819	38.469	97	97	96	96	1	0.91
Toluene			39.487	38.353	99	99	96	96	3	2.9
Chlorobenzene			39.679	39.684	99	99	99	99	0	0.013

LDC #: 60943F

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

#1 CC

Concentration = $\frac{(4500)(20)(5)}{(180273)(5.4)(0.88)(0.719)}$

= 0.73059 ug/kg

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

VOA 110

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	CC	0.73059	0.73	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EF
2nd Reviewer:

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	% RSD ≤ 20, r² ICV ≥ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_05232024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS 1R
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	No Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9	L2428918-18		Soil	05/23/2024	Category B

Notes:

5

W 91926120-1		

LDC #: 60943E

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/30/24 2124	CCV-GCMS5	Δ	23.5		All - MB1	J/UJ/A all ND
			MMM	38.1			
			EE	22			
			HH	25.9			
			4,6-Dinitro-o-cresol	24.8			
			TT	26.6			
	5/30/24 2148	CCV-GCMS5	IIII	26.8			
			VVVV	21.8		↓	↓
	5/28/24 2209	CCV-JULIET	MMM	32.9		MB1	J/UJ/A all ND
			X	24.9			
			EEE	23.1			
			FFF	22.4			
	5/28/24 2257	CCV-JULIET	IIII	33.1		↓	↓

	DOD	NFG		
%D	20%/50%	20%	RRF: 0.001 - poor performers	0.05 - all other analytes

LDC #:60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL GCMS5	2/6/2024	A	1.473	1.473	1.477	1.477	2.38	2.38
			S	1.059	1.059	1.053	1.053	6.78	6.78
			GG	1.077	1.077	1.070	1.070	4.77	4.77
			UU	1.064	1.064	1.076	1.076	7.84	7.84
			DDD	1.272	1.272	1.275	1.275	9.27	9.27
			JJJ	1.160	1.160	1.186	1.186	7.70	7.70

LDC # 60943E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal stanc
Cis = Concentration of internal standa

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	VOA GCMS5	5/30/24	A	1.477	1.13	1.13	23.5	23.5
			S	1.053	0.935	0.935	11.2	11.2
			GG	1.070	0.944	0.944	11.8	11.8
			UU	1.076	0.932	0.932	13.4	13.4
			PDD	1.275	1.131	1.131	11.3	11.3
			JJ	1.186	1.099	1.099	7.3	7.3

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943E

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ng/ml)	Surrogate Found (ng/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25	16.852	67	67	0
2-Fluorobiphenyl	↓	19.696	79	79	
Terphenyl-d14	↓	20.173	81	81	↓
Phenol-d5	50	31.682	63	63	↓
2-Fluorophenol	↓	31.307	63	63	↓
2,4,6-Tribromophenol	↓	45.86	91	91	↓

LDC # 60943E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1926120-2/3

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	30.344	29.241	76	76	73	73	4	3.7
N-Nitroso-di-n-propylamine			33.307	31.919	83	83	80	80	4	4.3
4-Chloro-3-methylphenol			35.230	32.661	88	88	82	82	7	7.6
Acenaphthene			30.907	28.748	77	77	72	72	7	7.2
Pentachlorophenol			31.053	28.931	78	78	72	72	8	7.1
Pyrene	↓	↓	35.596	32.443	89	89	81	81	9	9.3

LDC #: 60943E

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer FT

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

WG1926120-2 (LCS) Δ

$$\text{Concentration} = \frac{(174953)(40)(1)(1000)}{(162523)(1.419)(30.93)}$$

$$= 993 \text{ ug/kg}$$

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	Δ	993 ± 990	990	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAJ
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r^2 ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_05232024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	SW	%R out, No Qual, No assoc. sample
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9	L2428918-18		Soil	05/23/2024	Category B

Notes:

1 WG1926480-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	5/30/24	WG1927484-1	1	Methoxychlor	20.7	ALL, MB1 (ND)	J/UJ/A
			2	gamma-Chlordane (trans)	27.5	↓	↓
			1	Toxaphene	41.0		
			2	Toxaphene	64.4	↓	↓

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	2/22/2024	Dieldrin (CLP1)	0.984	0.984	1.023	1.023	7.60	7.60
			Dieldrin (CLP2)	0.996	0.996	1.000	1.000	3.37	3.36
			4,4'-DDD (CLP1)	0.797	0.797	0.837	0.837	7.16	7.16
			4,4'-DDD (CLP2)	0.818	0.818	0.833	0.833	4.29	4.29

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1927484-1	05/30/24	Dieldrin (CLP1)	1.023	1.189	1.189	16.2	16.2
			Dieldrin (CLP2)	1.000	1.191	1.191	19.1	19.1
			4,4'-DDD (CLP1)	0.837	0.907	0.907	8.4	8.4
			4,4'-DDD (CLP2)	0.833	0.913	0.913	9.6	9.6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	35.861	72	72	0
Tetrachloro-m- xylene	RTX-CLP2	50	37.236	74	74	0
Decachlorobiphenyl	RTX-CLP1	50	46.435	93	93	0
Decachlorobiphenyl	RTX-CLP2	50	50.871	102	102	0

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1925833-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	38.5	39.0	127	173.0	174.0	119	119	121	121	1	1
4,4'-DDD	38.5	39.0	0	52.1	50.6	135	135	130	130	3	3

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1926480-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.90	31.50	30.70	31.60	94	93	100	100	6	7
4,4'-DDD	32.90	31.50	30.10	30.60	92	91	97	97	5	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	Dieldrin	9.255E+08	4.842E+08	25	1.023	10.00	15.22	1.00	N/A	**30.7**	**30.7**	0
WG1926480-2												

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer: CL

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD≤20% r^2 ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-05232024 from same SDG
VI	Surrogate Spikes /IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No result<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9	L2428918-18		Soil	05/23/2024	Category B

Notes:

1 WG1926119-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST2	2/5/2024	1260-1 (CLP1)	0.078	0.078	0.074	0.074	17.16	17.45
			1260-1 (CLP2)	0.073	0.073	0.071	0.071	13.25	13.12

LDC#: 60943E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1926283-2	05/28/24	1260-1 (CLP1)	0.074	0.064	0.064	13.5	13.5
			1260-1 (CLP2)	0.071	0.068	0.068	4.2	4.2

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	374.941	75	75	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	400.176	80	80	0
Decachlorobiphenyl	RTX-CLP1	500.00	450.049	90	90	0
Decachlorobiphenyl	RTX-CLP2	500.00	454.597	91	91	0

LDC # _60943E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1926119-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	305	300	216	215	71	71	72	72	1	1

LDC # _60943E

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	4.811E+08	779000000	250	0.074	5.00	10.24	1.00	N/A	**2086.441**	2089.175	0
WG1926119-2												
	1260-Total =	(2089.175+2177.759+2169.966+2327.310+2272.588)						conc =	(2207)(5mL)		**final conc**	
			5						(10.24g) (5mL)		**(ug/Kg)**	
	=	2207.36						=	**216**		216	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-05232024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	SW	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9	L2428918-18		Soil	05/23/2024	Category B

Notes:

WG1927413-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Method:GC Herbicides (EPA SW 846 Method 8151A)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1927413-2/3	2,4-D				35	30	ALL, MB1 (ND)	JDET/P
	2,4,5-TP (Silvex)				31	↓	↓	↓

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1927999-2	05/31/24	2,4-D (CLP1)	0.240	0.252	0.252	5.0	5.0
			2,4-D (CLP2)	0.237	0.275	0.275	16.0	15.9

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.184	37	37	0
DCAA	RTX-CLP2	0.500	0.265	53	53	0

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1927413-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	194	196	0	163	140	84	84	71	71	15	15

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1927413-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	164	164	50	72	31	31	44	44	35	34

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	1.193E+08	8.144E+08	0.250	0.240	1.00	30.49	1.00	NA	**50**	**50**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428918
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_7-9	L2428918-18	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-05232024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 22, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.902 mg/Kg	4.510 mg/Kg	A13_7-9

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB-05232024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-05232024	Barium	0.00041 mg/L	0.00041 mg/Kg	A13_7-9

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB-05232024 for the wet chemistry analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-05232024	Total cyanide	0.002 mg/L	0.01 mg/Kg	A13_7-9
	Hexavalent chromium	0.003 mg/L	0.015 mg/Kg	

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
C5_0-0.2 MS/MSD (A13_7-9)	Mercury	122 (80-120)	31 (80-120)	UJ (all non-detects)

For C5_0-0.2 MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits. RPD were not evaluated for mercury since the MS and MSD were spiked at different concentrations and not comparable.

Wet Chemistry

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
A13_7-9	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NP
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB=FB_05232024
VII	Matrix Spike/Matrix Spike Duplicate	SW	C5_0-0.2 MS/MSD
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	~~A~~ N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < SampleRL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9 2x, all except Hg (matrix)	L2428918-18		Soil	05/23/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level (mg/kg)**					
Iron	0.902		4.510					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Sampling Date: 05/23/25

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level						
	FB_05232024							
Barium	0.00041	0.00041						

Comments: The action level, when applicable, is establised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943E_metals

VALIDATION FINDINGS WORKSHEETS
Matrix Spike/Matrix Spike Duplicates

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
C5_0-0.2 MS/MSD	soil	Mercury	122	31	80-120			All	J/UJ/A	ND

Comments: **C5_0-0.2 MS/MSD: multiple analytes >4x, %R**
***MS/MSD spikes not comparable for Mercury**

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Co	0.5	0.500	100	100	Y
CCV	ICP	Sb	0.489	0.500	97.8	98	Y
LLCC	ICP						
ICSAB	ICP	Al	501	500	100.2	100	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.003	0.0030	100	100	Y
CCV	CVAA	Hg	0.0098	0.0100	98	98	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1927216 LCS	LCS	Mn	43.2	40.0	108	108	Y
C5_0-0.2 MS	MS	Cu	21.8	22.6	96.46017699	96	Y
C5_0-0.2 MSD	Duplicate	K	3300	2940	11.53846154	12	Y
	PDS						
C5_0-0.2 SD	Serial dilution	As	55.9	64.6	13.46749226	13	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Zn	0.4662	2	1.308	50	88	40.5	40.50250209	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943E
SDG #: L2428918
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: _____

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	SW	FB=FB_05232024
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<NO Sample<RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9	L2428918-18		Soil	05/23/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: NF

METHOD: Inorganics

Blank units: m/L
Sampling Date: 05/23/24

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification							
Analyte	Blank ID	Action Level								
	FB_05232024									
Total Cyanide	0.002	0.01								
Hexavalent Chromium	0.003	0.015								

Comments: The action level, when applicable, is establised at 5X the highest concentration.

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10125	0.1		101.25	101	Y
Calibration verification	Cr(VI)	0.205	0.200		102.5	103	Y
Calibration verification	Cr(VI)	0.207	0.200		103.5	103	Y

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1927538 LCS	LCS	CN-	0.101	0.1	101	101	Y
	MS						
WG1927538 LCSD	Duplicate	CN-	0.096	0.101	5.076142132	5	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	0.03972	1	1.0299	50	88	1.1 U	0.043825967	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2428941
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 2, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_7-9_P	L2428941-06	PFAS

Associated QC Samples(s):

Field/Trip Blanks: FB_05232024_P
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 23, 2024 and was analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_05232024_P for PFAS analysis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943F
SDG #: L2428941
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: CF
2nd Reviewer:

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	LC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration/ISC/~~Bile Salt~~	A	CCV/ISC ≤ 30
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_05232024_P
VII	Matrix spike/Matrix spike duplicates	N	CS
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	N	
X	Internal standards	A	
XI	Target Analyte Quantitation	A	NO Results < RL > MDL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_7-9_P	L2428941-06		Soil	05/23/2024	Category B

Notes:

WG1931829-1		

LDC #: 60943F

VALIDATION FINDINGS CHECKLIST

Reviewer: FD

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			✓	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?			✓	
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were the retention time windows properly established?	✓			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	✓			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?				
Were all the retention times within the acceptance windows?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?			✓	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 60943F

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: EJ

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) ~~between 20-150%?~~ with lab limits	✓			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	✓			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	✓			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	✓			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	✓			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
Were ion ratios between 50-150%?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFAS

A. Perfluorobutanoic acid (PFBA)	X. NMeFOSA	UU. N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
B. Perfluoropentanoic acid (PFPeA)	Y. NEtFOSA	VV. Hexafluoropropylene oxide dimer acid (HFPO-DA)
C. Perfluorohexanoic acid (PFHxA)	Z. NMeFOSAA	WW. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
D. Perfluoroheptanoic acid (PFHpA)	AA. NEtFOSAA	XX. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
E. Perfluorooctanoic acid (PFOA)	BB. NMeFOSE	YY. 1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)
F. Perfluorononanoic acid (PFNA)	CC. NEtFOSE	ZZ. 1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)
G. Perfluorodecanoic acid (PFDA)	DD. HFPO-DA (GenX)	A1. 1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)
H. Perfluoroundecanoic acid (PFUnA)	EE. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	B1. N-ethylperfluorooctane sulfonamide (NEtFOSA)
I. Perfluorododecanoic acid (PFDoA)	FF. Perfluoro-4-methoxybutanoic acid (PFMBA)	C1. N-methylperfluorooctane sulfonamide (NMeFOSA)
J. Perfluorotridecanoic acid (PFTrDA)	GG. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	D1. N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)
K. Perfluorotetradecanoic acid (PFTeDA)	HH. Perfluoro-3-methoxypropanoic acid (PFMPA)	E1. N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)
L. Perfluorobutanesulfonic acid (PFBS)	II. 9Cl-PF3ONS	F1. 3-Perfluoropropyl propanoic acid (3:3FTCA)
M. Perfluoropentanesulfonic acid (PFPeS)	JJ. 11Cl-PF3OUdS	G1. 3-Perfluoropentylpropanoic acid (5:3FTCA)
N. Perfluorohexanesulfonic acid (PFHxS)	KK. Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	H1. 3-Perfluoroheptyl propanoic acid (7:3FTCA)
O. Perfluoroheptanesulfonic acid (PFHpS)	LL. 3:3 FTCA	
P. Perfluorooctanesulfonic acid (PFOS)	MM. 5:3 FTCA	
Q. Perfluorononanesulfonic acid (PFNS)	NN. 7:3 FTCA	
R. Perfluorodecanesulfonic acid (PFDS)	OO. 3:3 Fluorotelomer carboxylate (3:3 FTCA)	
S. Perfluorododecanesulfonic acid (PFDoS)	PP. 5:3 Fluorotelomer carboxylate (5:3 FTCA)	
T. 4:2 FTS	QQ. 7:3 Fluorotelomer carboxylate (7:3 FTCA)	
U. 6:2 FTS	RR. Perfluorooctadecanoic acid (PFODA)	
V. 8:2 FTS	SS. Perfluorohexadecanoic acid (PFHxDA)	
W. Perfluorooctanesulfonamide (PFOSA)	TT. N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LCMS EPA Method 1633

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 2.32/2.5 std)	Recalculated (RRF 2.32/2.5 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	5/16/2024	PFOS	1.160	1.160	1.102	1.102	4.370	4.370
	LCMS08		PFOA	0.790	0.790	0.755	0.755	9.790	9.790

LDC #: 60943 F

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD:
LC/MS/MSEPA Draft Method 1633
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	~~Amt~~ ~~Average~~ RRF (initial)	Reported Amt ~~RRF~~	Recalculated Amt ~~RRF~~	Reported %R	Recalculated %R
1	ccv	6/11/24	PFOA ($^{13}C_8$-PFOA)	2.5	1.909	1.909	76.4	76.4
		0626	PFOS ($^{13}C_8$-PFOS)	2.32	2.289	2.289	98.7	98.7
2			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
3			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
4			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
5			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943 F

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: _____

Method:
EPA Draft Method 1633
The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration
SA = Spike added

RPD = | LCSC - LCSDC | * 2/(LCSC + LCSDC)

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: WG1931829-3 (LCS)

Compound	Spike Added (ng/g)		Spike Concentration (ng/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2	NA	1.60	NA	80	80				
PFOS	1.86	↓	1.91	↓	103	103				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943 F

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Method:
LC/MS/MS EPA Draft Method 1633

The concentration of the sample was calculated for the compound identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. WG193829-3 (LCS) : PFOS

$$\text{Conc.} = \frac{(324474)(2.4)(4)}{(295116)(1.102)(5.0)}$$

$$= 1.915 \text{ ng/kg}$$

#	Sample ID	Analyte	Reported Concentration (ng/kg)	Calculated Concentration (ng/kg)	Qualification
	LCS	PFOS	1.915	1.91	-

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2429225
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E8_0.2-2	L2429225-02	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_05242024, FB_05242024
Field Duplicate pair: E8_0.2-2 and DUP_05242024

The above-listed soil sample was collected on May 24, 2024 and was analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/30/24	CCV-VOA100	Dichlorodifluoromethane	22.7	E8_0.2-2	UJ (all non-detects)
		Chloromethane	21.1		UJ (all non-detects)
		Vinyl chloride	21.3		UJ (all non-detects)
		Bromomethane	37.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/31/24	CCV-SV109	2,4-Dinitrophenol	20.7	E8_0.2-2	UJ (all non-detects)
		4-Nitrophenol	22.6		UJ (all non-detects)
		4,6-Dinitro-o-cresol	20.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide, PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1927816	Styrene	0.70 ug/Kg	RL	E8_0.2-2
	Unknown (9.79)	2.12 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the trip blank sample TB_05242024 and field blank sample FB_05242024 for VOC analysis.

SVOC

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_05242024 for SVOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_05242024	Phenol Benzyl alcohol	1.9 ug/L 0.81 ug/L	RL RL	E8_0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect.

Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_05242024 for pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples E8_0.2-2 and DUP_05242024 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SVOC

Analyte	Concentration (ug/Kg)		RPD
	E8_0.2-2	DUP_05242024	
Fluoranthene	110U	31	Not calculable
Pyrene	110U	26	Not calculable

Pesticide

Analyte	Concentration (ug/Kg)		RPD
	E8_0.2-2	DUP_05242024	
4,4'-DDE	0.472	8.56	179
Heptachlor epoxide	0.014U	1.2	Not calculable
Dieldrin	0.029U	0.654	Not calculable
4,4'-DDT	0.029U	2.38	Not calculable
trans-Chlordane	0.014U	1.12	Not calculable

VOC, PCB, Herbicide

No results were detected in any of the samples.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Field Duplicate Results

Samples E8_0.2-2 and DUP_05242024 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SVOC

Analyte	Concentration (ug/Kg)		RPD
	E8_0.2-2	DUP_05242024	
Fluoranthene	110U	31	Not ~~calculable~~
Pyrene	110U	26	Not calculable

~~Comparable~~

OK

Pesticide

Analyte	Concentration (ug/Kg)		RPD
	E8_0.2-2	DUP_05242024	
4,4'-DDE	0.472	8.56	179
Heptachlor epoxide	0.014U	1.2	Not calculable
Dieldrin	0.029U	0.654	Not calculable
4,4'-DDT	0.029U	2.38	Not calculable
trans-Chlordane	0.014U	1.12	Not calculable

VOC, PCB, Herbicide

No results were detected in any of the samples.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: CP
2nd Reviewer:

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%D RSD ≤ 20, 1 ICV ≤ 30 CCV ≤ 20
IV	Continuing Calibration	SW	
V	Laboratory Blanks	SW	
VI	Field Blank	N	FB= FB_05242024
VII	Surrogate Spikes	A	TB= TB_05242024
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	Lab ID
X	Field Duplicate	ND	D= 1, DUP_05242024
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NJ Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2	L2429225-02		Soil	05/24/2024	Category B

Notes:

WG1927816		

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20% and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30%?				
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓	✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n–Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/30/24	CCV-VOA 100	JJ	22.7		All	J/UJ/A ND
	0729		A	21.1			
			C	21.3		↓	↓
			B	37.1			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943G

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 5/30/24 **Associated samples:** All (ND)
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1								
FF	0.70								
TIC unknown	2.12 (9.79)								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943G

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	4/10/2024	C	0.267	0.267	0.291	0.291	14.11	14.11
	VOA100		CC	0.609	0.609	0.652	0.652	9.75	9.75
			MMM	1.560	1.560	1.579	1.579	7.56	7.56

LDC # 60943G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV-VOA100	5/30/24 0729	C	0.291	0.229	0.229	21.3	21.3
			CC	0.652	0.611	0.611	6.3	6.3
			MMM	1.579	1.683	1.683	6.6	6.6

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 G

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	10.0	9.91	99	99	0
1,2-Dichloroethane-d4		10.492	105	105	
Toluene-d8		10.057	101	101	
4-Bromofluorobenzene		9.343	93	93	

LDC # 60943G

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1927816-1 LCS 1D

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	34.66	32.384	87	87	81	81	7	6.81
Trichloroethene			37.402	35.822	94	94	90	90	4	4.3
Benzene			38.371	36.775	96	96	92	92	4	4.2
Toluene			37.487	35.596	94	94	89	89	5	5.2
Chlorobenzene			38.467	36.262	96	96	91	91	5	5.9

LDC #: 60943G

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

W G1927816 - lcs CC

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

$$\text{Concentration} = \frac{(414426)(20.0)}{(339140)(0.652)}$$

$$= 37.484 \text{ ug/kg}$$

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	CC	37.484	37.487	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB= FB_05242024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	LCS
IX	Laboratory Control Sample	A	LCS/LCSD
X	Field Duplicate	SW ~~NA~~	D=1, DUP_05242024
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2	L2429225-02		Soil	05/24/2024	Category B

Notes:

WG1927411		

LDC #: 60943G

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓	~~✓~~		
Were target analytes detected in the field duplicates?	✓		~~✓~~	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/30/24	CCV-SV103	O	24.6		MB1	J/UJ/A ND
	1110		X	24.3		↓	↓
	5/31/24	CCV-SV109	HH	30.7		All - MB1	J/UJ/A ND
	0052		II	22.6		↓	↓
			4,6-Dinitro-o-cresol	20.1		↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 609439

VALIDATION FINDINGS WORKSHEET
Field Blanks

FB_05242024

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.
Sampling date: 5/24/24 **Blank units:** ug/L **Associated sample units:** ug/kg
Field blank type: FB **Associated Samples:** All (ND

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB								
A	1.9								
QQQ	0.81								

Sampling date: _____ **Blank units:** _____ **Associated sample units:** _____
Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

LDC #: 60943G

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: ___FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound	Concentration (ug/kg)		RPD (≤ %)	Qualifications (Parent only)
	1	*		
YY	1104	31	NC	
ZZ	1104	26	NC	
		* DUP_05242024		

Compound	Concentration (ug/L)		RPD (≤ %)	Qualifications (Parent only)

Compound	Concentration (ug/L)		RPD (≤ %)	Qualifications (Parent only)

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20 ug/ml std)	Recalculated (RRF 20 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV109	12/23/2023	A	1.437	1.437	1.440	1.440	7.67	7.67
			S	1.022	1.022	1.036	1.036	2.17	2.17
			GG	1.024	1.024	1.044	1.044	3.09	3.09
			UU	1.016	1.016	1.041	1.041	3.44	3.44
			DDD	1.194	1.194	1.205	1.205	4.23	4.23
			JJJ	1.001	1.001	1.035	1.035	14.88	14.88

LDC # 60943 G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV SV109	5/31/21	A	1.440	1.375	1.375	4.5	4.5
			S	1.036	0.942	0.942	9.1	9.1
			GG	1.044	1.002	1.002	4	4
			UU	1.041	0.978	0.978	6.1	6.1
			DDD	1.205	1.158	1.158	3.9	3.9
			JJJ	1.035	1.043	1.043	0.8	0.8

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943G

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	24.433	98	98	0
2-Fluorobiphenyl		19.524	78	78	
Terphenyl-d14		23.108	92	92	
Phenol-d5	50.0	49.192	98	98	
2-Fluorophenol		44.691	89	89	
2,4,6-Tribromophenol		46.444	93	93	

LDC # 60943 G

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1927411 -2/3

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	28.192	27.677	70	70	69	69	1	1.8
N-Nitroso-di-n-propylamine			30.442	29.453	76	76	74	74	3	3.3
4-Chloro-3-methylphenol			32.559	32.144	81	81	80	80	1	1.3
Acenaphthene			29.408	27.860	74	74	70	70	6	5.4
Pentachlorophenol			28.673	26.270	72	72	66	66	9	8.7
Pyrene			30.695	29.931	77	77	75	75	3	2.5

LDC #: 60943 G

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG1927411 -2 (LCS) A

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(81720)(40)\ (1)(1000)}{(70094)\ (1.654)\ (30.25)}$

= 932 ug/kg

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	A	932 ≈ 930	930	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAJ
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r^2 ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB_05242024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	SW	Dup= 1 + DUP_05242024 (same SDG)
X	Target Analyte Quantitation	A	MDL< samples <RL, J det/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2	L2429225-02		Soil	05/24/2024	Category B

Notes:

1 WG1927813-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Compound	Concentration (ug/Kg)		RPD
	1	DUP_05242024	
4,4'-DDE	0.472	8.56	179
Heptachlor epoxide	0.014U	1.2	195
Dieldrin	0.029U	0.654	183
4,4'-DDT	0.029U	2.38	195
trans-Chlordane	0.014U	1.12	195

NC

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	2/22/2024	Dieldrin (CLP1)	0.984	0.984	1.023	1.023	7.60	7.60
			Dieldrin (CLP2)	0.996	0.996	1.000	1.000	3.37	3.36
			4,4'-DDE (CLP1)	0.981	0.981	1.019	1.019	5.68	5.68
			4,4'-DDE (CLP2)	1.009	1.009	0.999	0.999	2.07	2.05

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1928482-1	06/01/24	Dieldrin (CLP1)	1.023	1.019	1.019	0.4	0.4
			Dieldrin (CLP2)	1.000	1.029	1.029	2.9	2.9
			4,4'-DDE (CLP1)	1.019	0.909	0.909	10.8	10.8
			4,4'-DDE (CLP2)	0.999	0.929	0.929	7.0	7.0

LDC# 60943G

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	33.598	67	67	0
Tetrachloro-m- xylene	RTX-CLP2	50	35.055	70	70	0
Decachlorobiphenyl	RTX-CLP1	50	42.375	85	85	0
Decachlorobiphenyl	RTX-CLP2	50	44.168	88	88	0

LDC# 60943E

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1927813-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	44.1	42.9	4	43.0	47.0	90	90	101	101	9	9
4,4'-DDD	44.1	42.9	0	37.5	41.9	85	85	98	98	11	11

LDC# 60943G

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1927813-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.70	31.80	34.90	36.00	107	107	113	113	5	6
4,4'-DDD	32.70	31.80	33.00	34.80	101	101	109	109	8	8

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	1.385E+07	5.467E+08	25	1.023	10.00	15.54	1.00	85	**0.469**	**0.472**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MA
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20 ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB_05242024 from same SDG
VI	Surrogate Spikes / IS	/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	ND	DUP = 1 + DUP_05242024 (same SDG)
X	Target Analyte Quantitation	A	No result <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2	L2429225-02		Soil	05/24/2024	Category B

Notes:

1 WG1927600-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943G

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST13	12/20/2023	1260-1 (CLP1)	0.084	0.084	0.079	0.079	9.73	9.91
			1260-1 (CLP2)	0.077	0.077	0.068	0.068	17.19	17.04

LDC#: 60943G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1927960-1	05/31/24	1260-1 (CLP1)	0.079	0.071	0.071	10.1	10.3
			1260-1 (CLP2)	0.068	0.064	0.064	5.9	5.9

LDC # _60943G

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	353.910	71	71	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	374.188	75	75	0
Decachlorobiphenyl	RTX-CLP1	500.00	379.175	76	76	0
Decachlorobiphenyl	RTX-CLP2	500.00	438.421	88	88	0

LDC # _60943G

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1927660-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	290	301	178	179	61	61	60	59	2	2

LDC # _60943G

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	4.078E+08	693500000	250	0.079	5.00	10.77	1.00	N/A	**1857.501**	1858.453	0
WG1926119-2												
	1260-Total =	(1858.453+1867.203+1914.756+1936.112+2039.766)						conc =	(1723)(5mL)		**final conc**	
			5						(10.77g) (5mL)		**(ug/Kg)**	
	=	1923.26						=	**179**		179	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A /	
II	Initial Calibration/ ICV	A /A	RSD≤20% ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_05242024 from same SDG
VI	Surrogate Spikes / IS	A /A	
VII	Matrix Spike/Matrix Spike Duplicate	~~A~~ N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	ND	Dup = 1 + DUP_05242024 (same SDG)
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2	L2429225-02		Soil	05/24/2024	Category B

Notes:

WG1928122-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943G

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1928612-1	06/02/24	2,4-D (CLP1)	0.240	0.266	0.266	10.8	10.8
			2,4-D (CLP2)	0.237	0.276	0.276	16.5	16.3

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.387	77	77	0
DCAA	RTX-CLP2	0.500	0.383	77	77	0

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1927413-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	194	196	0	163	140	84	84	71	71	15	15

LDC# 60943G

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1928122-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	165	118	106	73	72	64	64	13	13

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/L)	Reported Conc. (ug/L)	% Diff
LCS	2,4-D	3.369E+08	7.413E+08	0.250	0.240	1.00	1000.00	1.00	NA	**4.73**	**4.74**	0
WG1926102-2												

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2429225
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E8_0.2-2	L2429225-02	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-05242024
Field Duplicate pair: E8_0.2-2 and DUP_05242024

The above-listed soil samples were collected on May 24, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

Metals

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (90-110)	Associated Samples	Validation Action
06/02/24	R1835754-3	Beryllium Iron	111 112	E8_0.2-2	J (all detects) J (all detects)

Wet Chemistry

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Chromium	0.213 mg/Kg	1.065 mg/Kg	E8_0.2-2
	Iron	2.44 mg/Kg	12.200 mg/Kg	
	Manganese	0.344 mg/Kg	1.720 mg/Kg	
	Nickel	0.191 mg/Kg	0.955 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB-05242024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-05242024	Barium	0.00017 mg/L	0.00085 mg/Kg	E8_0.2-2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-05242024 for metals analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
E8_0-0.2 MS/MSD (E8_0.2-2)	Arsenic	128	-	J (all detects)
	Potassium	-	133	J (all detects)

For E8_0-0.2 MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
E8_0-0.2 MS/MSD (E8_0.2-2)	Hexavalent chromium	42	49	UJ (all non-detects)

Relative percent differences (RPD) were not evaluated since the MS and MSD were spiked at different concentrations and not comparable.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

Samples E8_0.2-2 and DUP_05242024 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Metals

Analyte	Concentration (mg/Kg)		RPD
	E8_0.2-2	DUP_05242024	
Aluminum	17500	18000	3
Antimony	0.390	0.364	7
Arsenic	28.7	20.1	35
Barium	111	103	7
Beryllium	0.650	0.690	6
Calcium	579	552	5
Chromium	25.9	27.6	6
Cobalt	8.64	9.86	13
Copper	16.7	18.2	9
Iron	21100	23600	11
Lead	59.1	46.2	25
Magnesium	4270	4530	6
Manganese	466	521	11
Mercury	0.079	0.098	21
Nickel	16.3	17.5	7
Potassium	2270	2270	0
Sodium	86.8	63.0	32
Vanadium	38.9	40.1	3
Zinc	55.0	54.6	1

Wet Chemistry

No results were detected in any of the samples.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E8_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: _____

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	SW	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB= FB_05242024
VII	Matrix Spike/Matrix Spike Duplicate	SW	E8_0-0.2 MS/MSD
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A ~~N~~	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	SW	FD=(1, DUP_05242024)
XII	Target Analyte Quantitation	A	MDL<sample<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2 2x, all except Hg (matrix)	L2429225-02		Soil	05/24/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?		NO		
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?		NO		
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?	YES			
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEETS
Calibration

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
All initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were performed at the required frequency and were within the acceptance limits with the following exceptions:

Date	Time	Calibration ID	Analyte	%R	%R Limits	Associated Samples	Qualification	Det/ND
6/2/2024	11:29	R1835754-3	Beryllium	111	90-110	All	Jdet/A	Det
			Iron	112	90-110	All	Jdet/A	Det

Comments:

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level (mg/kg)**					
Chromium	0.213		1.065					
Iron	2.44		12.200					
Manganese	0.344		1.720					
Nickel	0.191		0.955					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 05/24/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level						
	FB_005242024							
Ba	0.00017	0.00085						

Comments: The action level, when applicable, is establised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943G_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
E8_0-0.2 MS/MSD	soil	Arsenic	128		75-125			All	Jdet/A	Det
		Potassium		133	75-125			All	Jdet/A	Det

Comments: **E8_0-0.2 MS/MSD: multiple analytes >4x, %R**

Method: Metals

Analyte	Concentration (mg/kg)		RPD
	1	DUP_05242024	
Aluminum	17500	18000	3
Antimony	0.390	0.364	7
Arsenic	28.7	20.1	35
Barium	111	103	7
Beryllium	0.650	0.690	6
Calcium	579	552	5
Chromium	25.9	27.6	6
Cobalt	8.64	9.86	13
Copper	16.7	18.2	9
Iron	21100	23600	11
Lead	59.1	46.2	25
Magnesium	4270	4530	6
Manganese	466	521	11
Mercury	0.079	0.098	21
Nickel	16.3	17.5	7
Potassium	2270	2270	0
Sodium	86.8	63.0	32
Vanadium	38.9	40.1	3
Zinc	55.0	54.6	1

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Ca	0.532	0.500	106.4	106	Y
CCV	ICP	Ni	0.491	0.500	98.2	98	Y
LLCC	ICP						
ICSAB	ICP	Mg	486	500	97.2	97	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.003	0.0030	100	101	Y
CCV	CVAA	Hg	0.0102	0.0100	102	102	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1928206 LCS	LCS	Hg	1.73	1.67	103.5928144	104	Y
E8_0-0.2 MS	MS	Ag	4.99	5.16	96.70542636	97	Y
E8_0-0.2 MSD	Duplicate	As	61.4	64.7	5.233941316	5	Y
E8_0-0.2 PDS	PDS	K	1120	1050	106.6666667	107	Y
E8_0-0.2 SD	Serial dilution	Fe	22600	21300	6.103286385	6	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Ca	6.5214	2	1.33	50	85	579	576.8597966	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943G
SDG #: L2429225
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_05242024
VI	Matrix Spike/Matrix Spike Duplicate	SW	E8_0-0.2 MS/MSD
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	ND	FD=(1, DUP_05242024)
X	Target Analyte Quantitation	A	~~MDL < RL~~ MDL<noSample<RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2	L2429225-02		Soil	05/24/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?		NO		
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
E8_0-0.2 MS/MSD	soil	Hexavalent Chromium	42	49	75-125			All	J/UJ/A	ND

Comments: ***MS and MSD spike not comparable**

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

Reviewer: NF

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	-0.00121	0.999988	0.99999	Y
		s2	0.2	0.00683			
		s3	0.5	0.01645			
		s4	1	0.03334			
		s5	2	0.06641			
		s6	5	0.17339			
		s7	10	0.3436			
		s8	25	0.86932			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10587	0.1		105.87	106	Y
Calibration verification	Cr(VI)	0.207	0.200		103.5	103	Y
Calibration verification	Cr(VI)	0.208	0.200		104	104	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1928905 LCS	LCS	CN-	78	72.5	107.5862069	108	Y
E8_0-0.2 MS	MS	Cr(VI)	471	1120	42.05357143	42	Y
WG1928905 LCSD	Duplicate	CN-	99	108	8.695652174	9	Y

*Lab uses CN- %R's to calculate RPD

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.00	1	2.5039	100	85	0.944 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2429497
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 2, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E8_0.2-2_P	L2429497-01	PFAS

Associated QC Samples(s):

Field/Trip Blanks: FB_05242024_P
Field Duplicate pair: E8_0.2-2_P and DUP_05242024_P

The above-listed soil sample was collected on May 24, 2024 and was analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_05242024_P for PFAS analysis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples E8_0.2-2_P and DUP_05242024_P were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ng/g)		RPD
	E8_0.2-2_P	DUP_05242024_P	
Perfluoroheptanoic acid (PFHpA)	0.037	0.033	11
Perfluorooctanoic acid (PFOA)	0.278	0.236	16
Perfluorooctanesulfonic acid (PFOS)	0.150	0.125	18

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943H
SDG #: L2429497
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	LC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration/ISC/Bile Salt	A	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_05242024_P
VII	Matrix spike/Matrix spike duplicates	N	CS
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	SW	D = 1, DUP_05242024_P
X	Internal standards	A	
XI	Target Analyte Quantitation	A	Result < RL > MDL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_0.2-2_P	L2429497-01		Soil	05/24/2024	Category B

Notes:

WG1933884-1 5		

LDC #: 60943H

VALIDATION FINDINGS CHECKLIST

Reviewer: KZ

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			✓	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?			✓	
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were the retention time windows properly established?	✓			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	✓			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	✓			
Were all the retention times within the acceptance windows?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?			✓	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?	✓			
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) ~~between 20-150%?~~ with lab limits	✓			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	✓			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	✓			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	✓			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	✓			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
Were ion ratios between 50-150%?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFAS

A. Perfluorobutanoic acid (PFBA)	X. NMeFOSA	UU. N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
B. Perfluoropentanoic acid (PFPeA)	Y. NEtFOSA	VV. Hexafluoropropylene oxide dimer acid (HFPO-DA)
C. Perfluorohexanoic acid (PFHxA)	Z. NMeFOSAA	WW. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
D. Perfluoroheptanoic acid (PFHpA)	AA. NEtFOSAA	XX. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
E. Perfluorooctanoic acid (PFOA)	BB. NMeFOSE	YY. 1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)
F. Perfluorononanoic acid (PFNA)	CC. NEtFOSE	ZZ. 1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)
G. Perfluorodecanoic acid (PFDA)	DD. HFPO-DA (GenX)	A1. 1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)
H. Perfluoroundecanoic acid (PFUnA)	EE. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	B1. N-ethylperfluorooctane sulfonamide (NEtFOSA)
I. Perfluorododecanoic acid (PFDoA)	FF. Perfluoro-4-methoxybutanoic acid (PFMBA)	C1. N-methylperfluorooctane sulfonamide (NMeFOSA)
J. Perfluorotridecanoic acid (PFTrDA)	GG. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	D1. N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)
K. Perfluorotetradecanoic acid (PFTeDA)	HH. Perfluoro-3-methoxypropanoic acid (PFMPA)	E1. N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)
L. Perfluorobutanesulfonic acid (PFBS)	II. 9Cl-PF3ONS	F1. 3-Perfluoropropyl propanoic acid (3:3FTCA)
M. Perfluoropentanesulfonic acid (PFPeS)	JJ. 11Cl-PF3OUdS	G1. 3-Perfluoropentylpropanoic acid (5:3FTCA)
N. Perfluorohexanesulfonic acid (PFHxS)	KK. Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	H1. 3-Perfluoroheptyl propanoic acid (7:3FTCA)
O. Perfluoroheptanesulfonic acid (PFHpS)	LL. 3:3 FTCA	
P. Perfluorooctanesulfonic acid (PFOS)	MM. 5:3 FTCA	
Q. Perfluorononanesulfonic acid (PFNS)	NN. 7:3 FTCA	
R. Perfluorodecanesulfonic acid (PFDS)	OO. 3:3 Fluorotelomer carboxylate (3:3 FTCA)	
S. Perfluorododecanesulfonic acid (PFDoS)	PP. 5:3 Fluorotelomer carboxylate (5:3 FTCA)	
T. 4:2 FTS	QQ. 7:3 Fluorotelomer carboxylate (7:3 FTCA)	
U. 6:2 FTS	RR. Perfluorooctadecanoic acid (PFODA)	
V. 8:2 FTS	SS. Perfluorohexadecanoic acid (PFHxDA)	
W. Perfluorooctanesulfonamide (PFOSA)	TT. N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

Method: GC/MS VOA (EPA Method TO15)

Analyte	Concentration (ng/g)		RPD
	E8_0.2-2_P	DUP_05242024_P	
Perfluoroheptanoic Acid (PFHpA)	0.037	0.033	11
Perfluorooctanoic Acid (PFOA)	0.278	0.236	16
Perfluorooctanesulfonic Acid (PFOS)	0.150	0.125	18

LDC #:60943H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LCMS EPA Method 1633

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 2.32/2.5 std)	Recalculated (RRF 2.32/2.5 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	4/11/2024	PFOS	1.120	1.120	1.181	1.181	10.12	10.12
			PFOA	0.750	0.750	0.8100	0.810	9.53	9.53

LDC #: 60943H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD:
LC/MS/MSEPA Draft Method 1633
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	~~Average~~ RRF (initial)	Reported ~~RRF~~	Recalculated ~~RRF~~	Reported %D	Recalculated %D
1	CCV	6/11/24	PFOA ($^{13}C_8$-PFOA)	2.50	2.051	2.051	82.1	82.04
		1020	PFOS ($^{13}C_8$-PFOS)	2.320	1.933	1.933	83.3	83.3
2			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
3			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
4			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
5			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943H

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: _____

Method:
EPA Draft Method 1633
The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: WG193184-3

Compound	Spike Added (ng/g)		Spike Concentration (ng/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2.0	NA	1.96	NA	98	98				
PFOS	1.86	↓	1.89	↓	102	102				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943H

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Method:
LC/MS/MS EPA Draft Method 1633

The concentration of the sample was calculated for the compound identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #1 , PFOA

$$\text{Conc.} = \frac{(77968)(2.5)(4)}{(681134)(0.810)(5.97)(0.85)}$$

$$= 0.278 \text{ ng/g}$$

#	Sample ID	Analyte	Reported Concentration (ng/g)	Calculated Concentration (ng/g)	Qualification
			0.278	0.278	-

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2430766
Reviewer:	Madeline Nicklo and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_2-4	L2430766-03	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 23, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943I
SDG #: L2430766
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAJ
2nd Reviewer: CP

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% r^2 ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<sample<RL, Jdet/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_2-4	L2430766-03		Soil	05/23/2024	Category B

Notes:

1 WG1929161-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943I

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	5/14/2024	Dieldrin (CLP1)	1.116	1.116	1.227	1.227	9.49	9.48
			Dieldrin (CLP2)	1.047	1.047	1.122	1.122	7.11	7.09
			4,4'-DDE (CLP1)	1.107	1.107	1.213	1.213	7.95	7.94
			4,4'-DDE (CLP2)	1.083	1.084	1.143	1.143	5.45	5.45

LDC# 60943I

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1930044-1	06/05/24	Dieldrin (CLP1)	1.227	1.154	1.155	5.9	5.9
			Dieldrin (CLP2)	1.122	1.100	1.100	2.0	2.0
			4,4'-DDE (CLP1)	1.213	1.123	1.123	7.4	7.4
			4,4'-DDE (CLP2)	1.143	1.031	1.031	9.8	9.8

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	33.884	68	68	0
Tetrachloro-m- xylene	RTX-CLP2	50	34.682	69	69	0
Decachlorobiphenyl	RTX-CLP1	50	36.223	72	72	0
Decachlorobiphenyl	RTX-CLP2	50	39.299	79	79	0

LDC# 60943I

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1929161-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.40	33.00	35.50	39.30	110	110	119	119	8	8
4,4'-DDD	32.40	33.00	35.60	39.60	110	110	120	120	9	9

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	1.407E+07	5.686E+07	25	1.227	10.00	15.36	1.00	91	**3.61**	**3.65**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2430766
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_2-4	L2430766-03	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 23, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Aluminum	11.6 mg/Kg	58 mg/Kg	A13_2-4
	Barium	0.118 mg/Kg	0.590 mg/Kg	
	Chromium	0.061 mg/Kg	0.305 mg/Kg	
	Iron	24.7 mg/Kg	123.5 mg/Kg	
	Magnesium	5.24 mg/Kg	26.2 mg/Kg	
	Manganese	0.246 mg/Kg	1.23 mg/Kg	
	Zinc	0.291 mg/Kg	1.455 mg/Kg	
ICB/CCB	Antimony	0.00557 mg/L	1.114 mg/Kg	A13_2-4
	Arsenic	0.00327 mg/L	0.654 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
A13 2-4	Antimony	0.524 mg/Kg	4.21U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
A13_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943I
SDG #: L2430766
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: [illegible]

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Sample < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_2-4 2X, all except Hg (matrix)	L2430766-03		Soil	05/23/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
Al	11.6		58					
Ba	0.118		0.590					
Cr	0.061		0.305					
Fe	24.7		123.5					
Mg	5.24		26.2					
Mn	0.246		1.23					
Zn	0.291		1.455					
Sb		0.00557	1.114	0.524/4.21U				
As		0.00327	0.654					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Cd	0.49	0.500	98	98	Y
CCV	ICP	Ag	0.505	0.500	101	101	Y
LLCC	ICP						
ICSAB	ICP	Al	522	500	104.4	104	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.0101	0.0100	101	101	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1929599 LCS	LCS	Ni	38.5	40.0	96.25	96	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Na	0.4194	2	1.305	50	91	35.4	35.31640773	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2430776
Reviewer:	Madeline Nicklo and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A4_2-4	L2430776-02	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 22, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943J
SDG #: L2430776
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A4_2-4	L2430776-02		Soil	05/22/2024	Category B

Notes:

1 WG1929161-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943J

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	4/23/2024	Dieldrin (CLP1)	1.010	1.010	1.024	1.024	5.42	5.41
			Dieldrin (CLP2)	1.132	1.133	1.141	1.141	6.24	6.24
			4,4'-DDD (CLP1)	0.854	0.855	0.830	0.830	5.26	5.31
			4,4'-DDD (CLP2)	0.949	0.949	0.949	0.949	4.83	4.82

LDC# 60943J

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1929658-1	06/04/24	Dieldrin (CLP1)	1.024	1.116	1.116	9.0	9.0
			Dieldrin (CLP2)	1.141	1.164	1.164	2.0	2.0
			4,4'-DDD (CLP1)	0.830	0.915	0.916	10.2	10.2
			4,4'-DDD (CLP2)	0.949	0.950	0.950	0.1	0.1

LDC# 60943J

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	29.017	58	58	0
Tetrachloro-m- xylene	RTX-CLP2	50	30.090	60	60	0
Decachlorobiphenyl	RTX-CLP1	50	32.102	64	64	0
Decachlorobiphenyl	RTX-CLP2	50	35.441	71	71	0

LDC# 60943J

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1929161-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.40	33.00	35.50	39.30	110	110	119	119	8	8
4,4'-DDD	32.40	33.00	35.60	39.60	110	110	120	120	9	9

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	Dieldrin	2.415E+08	1.076E+08	25	1.024	10.00	15.44	1.00	NA	**35.5**	**35.5**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2430766
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A4_2-4	L2430776-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 22, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Aluminum	11.6 mg/Kg	58 mg/Kg	A4_2-4
	Barium	0.118 mg/Kg	0.590 mg/Kg	
	Chromium	0.061 mg/Kg	0.305 mg/Kg	
	Iron	24.7 mg/Kg	123.5 mg/Kg	
	Magnesium	5.24 mg/Kg	26.2 mg/Kg	
	Manganese	0.246 mg/Kg	1.23 mg/Kg	
	Zinc	0.291 mg/Kg	1.455 mg/Kg	
ICB/CCB	Antimony	0.00557 mg/L	1.114 mg/Kg	A4_2-4
	Arsenic	0.00327 mg/L	0.654 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
A4 2-4	Antimony	0.456 mg/Kg	4.16U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
A4_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943J
SDG #: L2430776
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer:
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < sample < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A4_2-4 2x, all except Hg (matrix)	L2430776-02		Soil	05/22/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
Al	11.6		58					
Ba	0.118		0.590					
Cr	0.061		0.305					
Fe	24.7		123.5					
Mg	5.24		26.2					
Mn	0.246		1.23					
Zn	0.291		1.455					
Sb		0.00557	1.114	0.456/4.16U				
As		0.00327	0.654					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100 Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Cr	0.482	0.500	96.4	96	Y
CCV	ICP	Se	0.484	0.500	96.8	97	Y
LLCC	ICP						
ICSAB	ICP	Ca	488	500	97.6	98	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.0101	0.0100	101	101	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1929599 LCS	LCS	Zn	38.3	40.0	95.75	96	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
4	Be	0.0057	2	1.3	50	92	0.474	0.476588629	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2430854
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E8_2-4	L2430854-01	Metals
E8_2-4MS	L2430854-01MS	Metals
E8_2-4DUP	L2430854-01DUP	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 24, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Calcium	1.77 mg/Kg	8.850 mg/Kg	E8_2-4
	Iron	1.42 mg/Kg	7.100 mg/Kg	
	Selenium	0.169 mg/Kg	0.845 mg/Kg	
ICB/CCB	Selenium	0.00465 mg/L	0.93 mg/Kg	E8_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Matrix spike (MS) sample analysis was performed on an associated project sample. For E8_2-4MS, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Laboratory Duplicate Results

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E8_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943K
SDG #: L2430854
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	SW	2: multiple analytes >4x, 7.R
VIII	Laboratory Duplicate	A	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Sample < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E8_2-4 2x, all except Hg (matrix)	L2430854-01		Soil	05/24/2024	Category B
2	E8_2-4MS	L2430854-01MS	MS	Soil	05/24/2024	Category B
3	E8_2-4DUP	L2430854-01DUP	DUP	Soil	05/24/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Ca	1.77		8.850					
Fe	1.42		7.100					
Se	0.169		0.845					
Se		0.00465	0.93					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Al	0.475	0.500	95	95	Y
CCV	ICP	Ca	0.497	0.500	99.4	99	Y
LLCC	ICP						
ICSAB	ICP	Mg	486	500	97.2	97	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.0099	0.0100	99	99	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1929601 LCS	LCS	Hg	1.69	1.67	101.1976048	101	Y
2	MS	Pb	46.1	45.8	100.6550218	100	Y
3	Duplicate	Ba	112	118	5.217391304	5	Y
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST

Sample Calculation Verification

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Fe	237.3575	2	1.273	50	89	21000	20950.02516	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2431675
Reviewer:	Madeline Nicklo and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_4-6	L2431675-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on May 23, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943L
SDG #: L2431675
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD≤20%. r^2 ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_4-6	L2431675-01		Soil	05/23/2024	Category B

Notes:

1 WG1930879-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943L

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	2/22/2024	Dieldrin (CLP1)	0.984	0.984	1.023	1.023	7.60	7.60
			Dieldrin (CLP2)	0.996	0.996	1.000	1.000	3.37	3.36
			4,4'-DDD (CLP1)	0.797	0.797	0.837	0.837	7.16	7.16
			4,4'-DDD (CLP2)	0.818	0.818	0.833	0.833	4.29	4.29

LDC# 60943L

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1931412-1	06/07/24	Dieldrin (CLP1)	1.023	1.121	1.121	9.6	9.6
			Dieldrin (CLP2)	1.000	1.105	1.105	10.5	10.5
			4,4'-DDD (CLP1)	0.837	0.848	0.848	1.3	1.3
			4,4'-DDD (CLP2)	0.833	0.838	0.838	0.6	0.6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	37.851	76	76	0
Tetrachloro-m- xylene	RTX-CLP2	50	37.644	75	75	0
Decachlorobiphenyl	RTX-CLP1	50	43.879	88	88	0
Decachlorobiphenyl	RTX-CLP2	50	47.134	94	94	0

LDC# 60943L

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1930879-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.70	32.40	35.50	36.00	109	109	111	111	2	2
4,4'-DDD	32.70	32.40	34.00	34.20	104	104	106	106	2	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	Dieldrin	1.016E+09	4.569E+08	25	1.023	10.00	15.31	1.00	NA	**35.5**	**35.5**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2431675
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A13_4-6	L2431675-01	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 23, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Chromium	0.069 mg/Kg	0.345 mg/Kg	A13_4-6
	Iron	1.45 mg/Kg	7.250 mg/Kg	
ICB/CCB	Antimony	0.00479 mg/L	0.958 mg/Kg	A13_4-6
	Arsenic	0.00213 mg/L	0.43 mg/Kg	
	Selenium	0.00316 mg/L	0.632 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and ≤action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
A13_4-6	Antimony	0.760 mg/Kg	4.48U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
A13_4-6	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943L
SDG #: L2431675
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Sample < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A13_4-6 2K, all except Hg (matrix)	L2431675-01		Soil	05/23/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
Cr	0.069		0.345					
Fe	1.45		7.250					
Sb		0.00479	0.958	0.760/4.48U				
As		0.00213	0.43					
Se		0.00316	0.632					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Tl	0.485	0.500	97	97	Y
CCV	ICP	Cu	0.481	0.500	96.2	96	Y
LLCC	ICP						
ICSAB	ICP	Fe	188	200	94	94	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.003	0.0030	100	100	Y
CCV	CVAA	Hg	0.0102	0.0100	102	102	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1930954 LCS	LCS	Co	39.8	40.0	99.5	100	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	V	0.322	2	1.286	50	87	28.8	28.78032213	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2432392
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A6_0.2-2	L2432392-06	VOC, SVOC, Pesticide, PCB, Herbicide
A7_0-0.2	L2432392-09	Pesticide, Herbicide
A7_0-0.2MS	L2432392-09MS	Pesticide, Herbicide
A7_0-0.2MSD	L2432392-09MSD	Pesticide, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06102024, FB_06102024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 10, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/13/24	ICV-VOA131	1,4-Dioxane	0.00285 (≥0.005)	A6_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/13/24	CCV-VOA131	Dichlorodifluoromethane	48.4	A6_0.2-2	UJ (all non-detects)
		Chloromethane	54.2		UJ (all non-detects)
		Vinyl chloride	41.5		UJ (all non-detects)
		Bromomethane	27.7		UJ (all non-detects)
		Chloroethane	28.9		UJ (all non-detects)
		Trichlorofluoromethane	22		UJ (all non-detects)
		Acetone	46.6		UJ (all non-detects)
		Acrylonitrile	28.6		UJ (all non-detects)
		Vinyl acetate	55.8		UJ (all non-detects)
		2-Butanone	46.8		UJ (all non-detects)
		1,4-Dioxane	23.9		UJ (all non-detects)
		4-Methyl-2-pentanone	26.5		UJ (all non-detects)
		2-Hexanone	45.3		UJ (all non-detects)
		1,1,2,2-Tetrachloroethane	22.9		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/13/24	CCV-VOA131	1,4-Dioxane	0.00217 (≥0.005)	A6_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/15/24	CCV-Mindy	Bis(2-chloroisopropyl) ether	24.5	A6_0.2-2	UJ (all non-detects)
		2-Nitrophenol	28.2		UJ (all non-detects)
		2,4-Dimethylphenol	33.2		UJ (all non-detects)
		4-Nitrophenol	23.6		UJ (all non-detects)
		4,6-Dinitro-o-cresol	22		UJ (all non-detects)
		Di-n-octylphthalate	22.6		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/15/24	WG1934790-4	1	Endrin aldehyde	20.2	A6_0.2-2	UJ (all non-detects)
06/15/24	WG1934790-4	2	4,4'-DDT Endrin aldehyde	20.6 27.8	A6_0.2-2	UJ (all non-detects) UJ (all non-detects)
06/15/24	WG1934875-1	1	Endrin aldehyde	21.6	A7_0-0.2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1934454-5	Methylene chloride	2.9 ug/Kg	RL	A6_0.2-2
	Styrene	0.32 ug/Kg	RL	
	1,2,4,5-Tetramethylbenzene	1.2 ug/Kg	RL	
	Unknown (1.47)	3.49 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
A6_0.2-2	Methylene chloride	3.7 ug/Kg	6.3U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06102024 for VOC analysis.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06102024 for pesticide and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC, SVOC, PCB

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide, Herbicide

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1934454-LCS/LCSD (A6_0.2-2)	Chloromethane	46 (52-130)	47 (52-130)	UJ (all non-detects)
	Vinyl chloride	59 (67-130)	59 (67-130)	UJ (all non-detects)
	Acetone	53 (54-140)	-	UJ (all non-detects)
	2-Butanone	53 (70-130)	52 (70-130)	UJ (all non-detects)
	Vinyl acetate	44 (70-130)	42 (70-130)	UJ (all non-detects)
	2-Hexanone	55 (70-130)	57 (70-130)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

SVOC, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC, SVOC, pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the PCB and herbicide analyses. Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
A7_0-0.2	cis-Chlordane	169	J (all detects)
	trans-Chlordane	54	J (all detects)
A6_0.2-2	4,4'-DDE	86	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EF
2nd Reviewer:

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/A	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB_06102024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	LCS
IX	Laboratory Control Sample	SW	LCS 1D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = Jdet
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A6_0.2-2	L2432392-06		Soil	06/10/2024	Category B

Notes:

WG1934454-5 BLK		

LDC #: 60943 MA

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20% and relative response factors (RRF) ≥ 0.05?	NA	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943M

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	5/13/24	ICV-VOA13	HHHH		0.00285 (≥0.005)	All	J/UJ/A ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/13/24	CCV - VOA 131	JJ	48.4		All	J/UJ/A all ND
	2030		A	54.2			
			C	41.5			
			B	27.7			
			D	28.9			
			KK	22			
			F	46.6			
			GGGG	28.6			
			HH	55.8			
			M	46.8			
			HHHH	23.9			
			HHHH		0.00217 (≥0.005)		
			Y	26.5			
			Z	45.3			
			BB	22.9			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943 M

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/13/24 **Associated samples:** All
Conc. units: ng/kg

	Compound	Blank ID	Sample Identification							
		MB1		1						
	E	2.9		3.7 | 6.34						
	FF	0.32		-						
	A2	1.2		-						
TIC	Unknown	3.49 | 1.47		-						

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943M

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: EJ

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG193445-	A	46	47	52-130			All	J/UJ/P ND
LCS ID	C	59	59	67-130			↓	↓
	F	53		54-140				
	M	53	52	70-130				
	HH	44	42	70-130				
	Z	55	57	70-130			↓	↓

LDC #:60943M

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	5/13/2024	E	0.249	0.249	0.247	0.247	3.82	3.82
	VOA131		CC	0.643	0.643	0.675	0.675	8.33	8.33
			BB	0.428	0.428	0.472	0.472	17.29	17.29

LDC # 60943 M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA 131	6/13/24 2030	E	0.247	0.249	0.249	0.8	0.8
			CC	0.675	0.704	0.704	4.3	4.3
			BB	0.472	0.364	0.364	22.9	22.9

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 M

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.074	95	95	0
1,2-Dichloroethane-d4	↓	19.034	95	95	
Toluene-d8		20.868	104	104	
4-Bromofluorobenzene	↓	23.601	118	118	↓

LDC # 60943M

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG193454-LCS1D

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	39.806	42.120	100	100	105	105	5	5.6
Trichloroethene	↓	↓	43.490	43.012	109	109	108	108	1	1.1
Benzene			39.829	38.973	100	100	97	97	3	2.17
Toluene			41.703	38.913	104	104	97	97	7	6.9
Chlorobenzene			40.096	38.727	100	100	97	97	3	3.47

LDC #: 60943 M

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

#1 E

Final Conc = Conc *Vp*DF / VS

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(6577)(20.0)(5)}{(179928)(0.247)(4.7)(0.84)}$

= 3.748 ng/kg

VOA 131

Sample #	Analyte	Calculated Concentration (ng/kg)	Reported Concentration (ng/kg)	% Diff
#1	E	3.748	3.7	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EJ
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

+TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20,15 ICV ± 30
IV	Continuing Calibration	SW	CCV ± 20
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	LCS
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL- Jet
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A6_0.2-2	L2432392-06		Soil	06/10/2024	Category B

Notes:

WG1934254		

LDC #: 60943 M

VALIDATION FINDINGS CHECKLIST

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943 M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/15/24	CCV - Mindy	MMM	24.5		All - MB1	J/UJ/A ND
	0724		N	28.2			
			O	33.2			
			II	23.6			
			4,6-Dinitro-o-cresol	22			
			FFF	22.6			
	6/15/24	CCV-SV124	U	26.5		MB1	J/UJ/A ND
	0200		X	41.1			
			4,6-Dinitro-o-cresol	23.6			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL Mindy	2/20/2024	A	1.595	1.595	1.617	1.617	2.30	2.30
			S	1.069	1.069	1.086	1.086	4.97	4.97
			GG	1.119	1.119	1.113	1.113	4.14	4.14
			UU	1.082	1.082	1.098	1.098	5.86	5.86
			DDD	1.306	1.306	1.291	1.291	6.97	6.97
			JJJ	1.166	1.166	1.176	1.176	4.70	4.70

LDC # 60943M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv Mindy	6/15/24 0732	A	1.617	1.596	1.596	1.3	1.3
			S	1.086	0.98	0.98	9.8	9.8
			GG	1.113	1.058	1.058	4.9	4.9
			UU	1.098	1.042	1.042	5.1	5.1
			DDD	1.291	1.273	1.273	1.4	1.4
			WW	1.176	1.203	1.203	2.3	2.3

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 M

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	16.127	65	65	0
2-Fluorobiphenyl	↓	15.224	61	61	↓
Terphenyl-d14	↓	13.930	56	56	↓
Phenol-d5	50.0	39.166	78	78	↓
2-Fluorophenol	↓	40.434	81	81	↓
2,4,6-Tribromophenol	↓	41.609	83	83	↓

LDC # 60943M

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1934254-2/3

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	35.919	32.648	90	90	82	82	9	9.5
N-Nitroso-di-n-propylamine			36.064	33.233	90	90	83	83	8	8.2
4-Chloro-3-methylphenol			36.037	34.246	90	90	86	86	5	5.1
Acenaphthene			34.605	32.563	86	86	81	81	6	6.1
Pentachlorophenol			38.948	36.388	97	97	91	91	6	6.8
Pyrene			37.473	36.974	94	94	92	92	2	1.3

LDC #: 60943 M

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer FT

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliliters (mL)
Vp = Purge Volume

#1 DDD

$$\text{Concentration} = \frac{(3856)(40.0)(1)(1000)}{(187742)(30.17)(0.84)(1.291)}$$

$$= 25.11$$

Sample #	Analyte	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
#1	DDD	25.11	25	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% r^2 ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06102024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	~~N SW~~	~~Dup=1 + DUP_06102024 (same SDG)~~
X	Target Analyte Quantitation	SW	MDL<Samples<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1 1	A6_~~0-0.2~~ 0.2-2	L2432392-06		Soil	06/10/2024	Category B
2 2	A7_0-0.2	L2432392-09		Soil	06/10/2024	Category B
3	A7_0-0.2MS	L2432392-09MS		Soil	06/10/2024	Category B
4	A7_0-0.2MSD	L2432392-09MSD		Soil	06/10/2024	Category B

Notes:

1 WG1934401-1		
2 WG1934667-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/15/24	WG1934790-4	1	Endrin Aldehyde	20.2	1, MB1 (ND)	J/UJ/A
			2	4,4'-DDT	20.6	↓	↓
			2	Endrin Aldehyde	27.8	↓	
	6/15/24	WG1934875-1	1	Endrin Aldehyde	21.6	2, MB2 (ND)	↓

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2 (DET)	cis-Chlordane	169	JDET/A
		trans-Chlordane	54	J
	1	4,4'-DDE	86	J DET/A

Comments:

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDE (CLP1)	1.316	1.316	1.381	1.381	16.23	16.23
			4,4'-DDE (CLP2)	1.232	1.232	1.211	1.211	5.86	5.86

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	6/13/2024	Dieldrin (CLP1)	1.233	1.264	1.289	1.289	3.53	3.52
			Dieldrin (CLP2)	1.226	1.226	1.299	1.299	4.23	4.24
			4,4'-DDE (CLP1)	1.227	1.300	1.291	1.291	5.03	5.04
			4,4'-DDE (CLP2)	1.262	1.262	1.304	1.304	2.71	2.71

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1934875-1 PEST15	06/15/24	Dieldrin (CLP1)	1.322	1.365	1.365	3.3	3.3
			Dieldrin (CLP2)	1.156	1.167	1.167	1.0	1.0
			4,4'-DDE (CLP1)	1.381	1.305	1.304	5.5	5.5
			4,4'-DDE (CLP1)	1.211	1.121	1.121	7.4	7.5

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1934790-1 PEST11	06/15/24	Dieldrin (CLP1)	1.289	1.390	1.389	7.8	7.8
			Dieldrin (CLP2)	1.299	1.311	1.310	0.9	0.9
			4,4'-DDE (CLP1)	1.291	1.315	1.314	1.9	1.9
			4,4'-DDE (CLP2)	1.304	1.252	1.251	4.0	4.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	31.800	64	64	0
Tetrachloro-m- xylene	RTX-CLP2	50	34.561	69	69	0
Decachlorobiphenyl	RTX-CLP1	50	36.142	72	72	0
Decachlorobiphenyl	RTX-CLP2	50	37.292	75	75	0

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	44.2	44.3	4.71	30.7	40.3	59	59	80	80	27	27
4,4'-DDD	44.2	44.3	0	27.0	35.6	61	61	80	80	27	27

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1934401-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	33.30	31.40	32.70	29.50	98	98	94	94	4	4
4,4'-DDD	33.30	31.40	32.20	29.00	97	97	92	92	5	5

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
2	4,4'-DDE	3.095E+08	1.610E+08	25	1.211	10.00	15.28	1.00	72	**36.1**	**36.1**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD ≤ 20%. ICV ≤ 20%.
III	Continuing Calibration	A	%D ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	N	~~FB = FB-06102024 from same SDG~~
VI	Surrogate Spikes /IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	~~Dup = 1 + DUP-06102024~~
X	Target Analyte Quantitation	A	No results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A6_~~0-0.2~~0.2-2	L2432392-06		Soil	06/10/2024	Category B

Notes:

1 WG1934655-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943M

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/12/2024	1260-1 (CLP1)	0.058	0.058	0.055	0.055	2.68	2.90
			1260-1 (CLP2)	0.048	0.048	0.049	0.049	4.36	4.46

LDC#: 60943M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1934754-1	06/15/24	1260-1 (CLP1)	0.055	0.050	0.050	9.1	9.6
			1260-1 (CLP2)	0.049	0.045	0.045	8.2	8.2

LDC # _60943M

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	310.663	62	62	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	329.110	66	66	0
Decachlorobiphenyl	RTX-CLP1	500.00	260.568	52	52	0
Decachlorobiphenyl	RTX-CLP2	500.00	281.964	56	56	0

LDC # _60943M

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1934655-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	301	301	222	210	74	74	70	70	6	5

LDC # _60943M

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	1.412E+08	262600000	250	0.055	5.00	10.38	1.00	N/A	**2431.460**	2429.467	0
	1260-Total =	(2429.467+2338.355+2322.900+2291.293+2131.981)						conc =	(1723)(5mL)		**final conc**	
			5						(10.77g) (5mL)		**(ug/Kg)**	
	=	2302.80						=	**222**		222	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06102024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCSID
IX	Field Duplicate	ND	~~Dup = 1 + DUP-06102024 (same SDG)~~
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A6_~~0-0.2~~ 0.2-2	L2432392-06		Soil	06/10/2024	Category B
2	A7_0-0.2	L2432392-09		Soil	06/10/2024	Category B
3	A7_0-0.2MS	L2432392-09MS		Soil	06/10/2024	Category B
4	A7_0-0.2MSD	L2432392-09MSD		Soil	06/10/2024	Category B

Notes:

1 WG1934366-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1934944-2	06/16/24	2,4-D (CLP1)	0.240	0.242	0.242	0.8	0.8
			2,4-D (CLP2)	0.237	0.261	0.261	10.1	10.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.407	81	81	0
DCAA	RTX-CLP2	0.500	0.431	86	86	0

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	231	230	0	194	180	84	84	78	78	7	7

LDC# 60943M

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1934366-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	163	141	148	86	87	91	91	6	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	3.724E+08	8.972E+08	0.250	0.240	1.00	30.64	1.00	NA	**141**	**141**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2432392
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A6_0.2-2	L2432392-05	Metals, Wet Chemistry
A7_0-0.2	L2432392-09	Metals, Wet Chemistry
A7_0-0.2MS	L2432392-09MS	Metals, Wet Chemistry
A7_0-0.2MSD	L2432392-09MSD	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06102024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 10, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	1.1 mg/Kg	5.500 mg/Kg	A6_0.2-2 A7_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

No positive results were found in the field blank sample FB_06102024 for metals analyses.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06102024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
A7_0-0.2MS/MSD (A6_0.2-2 A7_0-0.2)	Arsenic	-	126 (75-125)	J (all detects)

For A7_0-0.2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
A7_0-0.2MS/MSD (A6_0.2-2 A7_0-0.2)	Hexavalent chromium	63 (75-125)	55 (75-125)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

All criteria were met.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
A6_0.2-2 A7_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: NF
Reviewer:
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	ND	FB
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	LRL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A6_0.2-2 all except Hg	L2432392-06		Soil	06/10/2024	Category B
2	A7_0-0.2	L2432392-09		Soil	06/10/2024	Category B
3	A7_0-0.2MS	L2432392-09MS		Soil	06/10/2024	Category B
4	A7_0-0.2MSD	L2432392-09MSD		Soil	06/10/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?	YES			
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

Field Duplicates

Method: Metals

Analyte	Concentration (mg/kg)		RPD
	1	DUP 06102024	
Aluminum	14500	13300	9
Arsenic	19.0	21.4	12
Barium	66.8	63.9	4
Beryllium	0.468	0.468	0
Cadmium	0.255	0.269	5
Calcium	749	843	12
Chromium	27.5	31.0	12
Cobalt	7.92	7.07	11
Copper	14.9	14.5	3
Iron	18800	17200	9
Lead	62.6	72.6	15
Magnesium	4200	3850	9
Manganese	368	366	1
Mercury	0.344	0.556	47
Nickel	15.6	14.3	9
Potassium	893	772	15
Selenium	1.86 U	0.303	144
Sodium	27.9	27.0	3
Thallium	0.354	0.306	15
Vanadium	30.1	27.6	9
Zinc	54.0	58.6	8

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe	1.1		5.500					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEETS
Matrix Spike/Matrix Spike Duplicates

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	As		126	75-125			All	Jdet/A	Det

Comments: **3-4: multiple analytes >4x, %R**

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100 Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	K	5.48	5.000	109.6	110	Y
CCV	ICP	Fe	0.499	0.500	99.8	100	Y
LLCC	ICP						
ICSAB	ICP	Al	513	500	102.6	103	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.0099	0.0100	99	99	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1934071 LCS	LCS	Hg	1.62	1.67	97.00598802	97	Y
3	MS	Cu	26.2	26.9	97.39776952	97	Y
4	Duplicate	Sb	44.4	40.2	9.929078014	10	Y
2 PDS	PDS	As	13.5	13	103.8461538	104	Y
2 SD	Serial dilution	Fe	24000	22500	6.666666667	7	Y

VALIDATION FINDINGS CHECKLIST

Sample Calculation Verification

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Mg	45.1918	2	1.258	50	86	4200	4177.154583	Y
2	As	0.2706	2	1.284	50	72	29.3	29.27050883	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943M
SDG #: L2432392
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: NF
Reviewer: I
2nd Reviewer: Q

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB-06102024
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A6_0.2-2	L2432392-06		Soil	06/10/2024	Category B
2	A7_0-0.2	L2432392-09		Soil	06/10/2024	Category B
3	A7_0-0.2MS	L2432392-09MS		Soil	06/10/2024	Category B
4	A7_0-0.2MSD	L2432392-09MSD		Soil	06/10/2024	Category B

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
~~5~~ 1	CN-
1-2, ~~5~~	Cr(VI)
QC	
3-4	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?		NO		
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	Cr(VI)	63	55	75-125			All	J/UJ/A	ND

Comments:

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

Reviewer: NF

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10967	0.1		109.67	110	Y
Calibration verification	Cr(VI)	0.189	0.200		94.5	94	Y
Calibration verification	Cr(VI)	0.186	0.200		93	93	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1934711 LCS	LCS	CN-	65	72.5	89.65517241	90	Y
3	MS	Cr(VI)	901	1440	62.56944444	63	Y
4	Duplicate	Cr(VI)	ND	ND	NC	NC	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

Reviewer: NF

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.00	1	2.5832	100	86	0.934 U	0	Y
2	Cr(VI)	0.00	1	2.5181	100	72	1.11 U	0	Y
5	CN-	0.06965	1	1.0502	50	84	1.1 U	0.078953215	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2432791
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B12_0.2-2	L2432791-06	Pesticide, Herbicide
B8_0.2-2	L2432791-22	VOC, SVOC, Pesticide, PCB, Herbicide
B8_0.2-2MS	L2432791-22MS	VOC, SVOC, Pesticide, PCB, Herbicide
B8_0.2-2MSD	L2432791-22MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06112024, FB_06112024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 11, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/15/25	ICAL-VOA110	1,4-Dioxane	0.00315 (≥0.005)	B8_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/16/24	ICV-VOA110	Carbon disulfide	33.9	B8_0.2-2	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/15/24	CCV-VOA110	Dichlorodifluoromethane	22.5	B8_0.2-2	UJ (all non-detects)
		Chloroethane	29.8		UJ (all non-detects)
		Trichlorofluoromethane	20.8		UJ (all non-detects)
		Acetone	20.8		UJ (all non-detects)
		trans-1,2-Dichloroethene	27.6		UJ (all non-detects)
		Methyl-tert-butyl ether	45.3		UJ (all non-detects)
		Bromoform	20.1		UJ (all non-detects)
		Hexachlorobutadiene	20.2		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/15/24	CCV-VOA110	1,4-Dioxane	0.0029 (≥0.005)	B8_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/17/24	CCV-JULIET	Bis(2-chloroisopropyl) ether	58.4	B8_0.2-2	J (all detects)
		4-Chloroaniline	25		UJ (all non-detects)
		4-Nitrophenol	23.9		

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/17/24	WG1935124-2	2	Chlordane	20.1	B12_0.2-2 B8_0.2-2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1935264-5	Bromomethane	2.6	RL	B8_0.2-2
	Styrene	0.24	RL	
	Unknown (1.56)	10.8	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte TIC (RT in minutes)	Level Detected	Validation Action
B8_0.2-2	Unknown (1.56)	17.6 ng/Kg	17.6U ng/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06112024 and field blank sample FB_06112024 for VOC analysis.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06112024 for SVOC, pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
B8_0.2-2MS/MSD (B8_0.2-2)	Dibromochloromethane	60 (70-130)	57 (70-130)	J (all detects) UJ (all non-detects)
	Tetrachloroethene	62 (70-130)	52 (70-130)	
	Chlorobenzene	55 (70-130)	49 (70-130)	
	trans-1,3-Dichloropropene	64 (70-130)	59 (70-130)	
	cis-1,3-Dichloropropene	60 (70-130)	53 (70-130)	
	Bromoform	51 (70-130)	49 (70-130)	
	1,1,2,2-Tetrachloroethane	67 (70-130)	68 (70-130)	
	Toluene	-	64 (70-130)	
	Ethylbenzene	64 (70-130)	56 (70-130)	
	Trichloroethene	-	69 (70-130)	
	1,2-Dichlorobenzene	36 (70-130)	32 (70-130)	
	1,3-Dichlorobenzene	38 (70-130)	32 (70-130)	
	1,4-Dichlorobenzene	36 (70-130)	30 (70-130)	
	m,p-Xylene	59 (70-130)	50 (70-130)	
	o-Xylene	57 (70-130)	50 (70-130)	
	Dibromomethane	-	69 (70-130)	
	Styrene	49 (70-130)	41 (70-130)	
	2-Butanone	65 (70-130)	62 (70-130)	
	Vinyl acetate	16 (70-130)	15 (70-130)	
	4-Methyl-2-pentanone	56 (70-130)	44 (70-130)	
	1,2,3-Trichloropropane	-	67 (68-130)	
	2-Hexanone	31 (70-130)	20 (70-130)	
	Bromochloromethane	69 (70-130)	63 (70-130)	
	1,2-Dibromoethane	62 (70-130)	60 (70-130)	
	1,1,1,2-Tetrachloroethane	63 (70-130)	58 (70-130)	
	Bromobenzene	44 (70-130)	41 (70-130)	
	n-Butylbenzene	46 (70-130)	30 (70-130)	
	sec-Butylbenzene	54 (70-130)	39 (70-130)	
	tert-Butylbenzene	54 (70-130)	42 (70-130)	
	o-Chlorotoluene	53 (70-130)	44 (70-130)	
	p-Chlorotoluene	46 (70-130)	39 (70-130)	
	1,2-Dibromo-3-chloropropane	49 (68-130)	46 (68-130)	
	Hexachlorobutadiene	28 (67-130)	15 (67-130)	
	Isopropylbenzene	61 (70-130)	49 (70-130)	
	p-Isopropyltoluene	45 (70-130)	33 (70-130)	
	Naphthalene	27 (70-130)	25 (70-130)	
	Acrylonitrile	44 (70-130)	46 (70-130)	
	p-Propylbenzene	57 (70-130)	44 (70-130)	
	1,2,3-Trichlorobenzene	21 (70-130)	16 (70-130)	
	1,2,4-Trichlorobenzene	22 (70-130)	18 (70-130)	
	1,3,5-Trimethylbenzene	52 (70-130)	41 (70-130)	
	1,2,4-Trimethylbenzene	47 (70-130)	39 (70-130)	
	p-Diethylbenzene	40 (70-130)	28 (70-130)	
	p-Ethyltoluene	50 (70-130)	39 (70-130)	
	1,2,4,5-Tetramethylbenzene	33 (70-130)	25 (70-130)	
	Ethyl ether	87 (67-130)	81 (67-130)	
	trans-1,4-Dichloro-2-butene	47 (70-130)	40 (70-130)	

Relative percent differences (RPD) were not evaluated since the MS and MSD were spiked at different concentrations and not comparable.

SVOC, Pesticide, PCB, Herbicide

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1935264-3/4 (B8 0.2-2)	Methyl-tert-butyl ether	145 (66-130)	137 (66-130)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the SVOC, PCB and herbicide analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Pesticide Analysis Reported
B12_0.2-2	2-fold dilution due to nature of sample matrix

Dilutions were not required for VOC, SVOC, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
B12_0.2-2	Heptachlor epoxide	67	J (all detects)
	cis-Chlordane	113	J (all detects)
	trans-Chlordane	41	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EJ
2nd Reviewer: CL

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	%RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	FB = FB_06112024
VII	Surrogate Spikes	A	TB = TB_06112024
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = Jdet
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B8_0.2-2	L2432791-22		Soil	06/11/2024	Category B
2	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
3	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B

Notes:

WG1935264-5 Blank		

LDC #: 60943 N

VALIDATION FINDINGS CHECKLIST

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15~~ 20% and relative response factors (RRF) ≥ 0.05?	~~✓~~	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?			✓	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	5/15/25	ICAL -VOA 110	HHH		0.00315 (≥0.005)	All	J/UA ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: PM

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	5/16/24 0338	ICV-VOA 110	G	33.9	All	J/UJ/A NP

	DOD	NFG
%D	20%	30%

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/15/24 0856	CCV-VOA 110	JJ	22.5		All	J/UJ/A NP
			D	29.8			
			KK	20.8			
			F	20.8			
			PPP	27.6			
			LL	45.3			
			X	20.1			
			LLL	20.2			
			HHHH		0.0029 (≥0.005	All	J/UJ/A ND

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/15/24 **Associated samples:** all
Conc. units: ng/Kg

Compound	Blank ID	Sample Identification							
	MB1		1						
B	2.6		-						
FF	0.24		-						
Unknown	10.8 (1.5Z)		17.6 (1.5Z)						

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943N

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: F2

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.
Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2+3	several %R outside limit							J/UJ/A NP+RT
	% RPD = not calculated due to significant difference in spike Amt							

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2432791
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: B8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2432791-22	Analysis Date	: 06/15/24 17:05
Matrix Spike	: WG1935264-6	MS Analysis Date	: 06/15/24 19:48
Matrix Spike Dup	: WG1935264-7	MSD Analysis Date	: 06/15/24 20:15

2 of 3

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
Methylene chloride	ND	163	140	86	137	110	79	26	70-130	30
1,1-Dichloroethane	ND	163	160	96	137	120	88	26	70-130	30
Chloroform	ND	163	140	86	137	110	79	26	70-130	30
Carbon tetrachloride	ND	163	150	91	137	110	79	32 Q	70-130	30
1,2-Dichloropropane	ND	163	130	82	137	110	77	24	70-130	30
Dibromochloromethane	ND	163	98	60 Q	137	78	57 Q	23	70-130	30
1,1,2-Trichloroethane	ND	163	120	74	137	97	71	21	70-130	30
Tetrachloroethene	ND	163	100	62 Q	137	71	52 Q	35 Q	70-130	30
Chlorobenzene	ND	163	90	55 Q	137	68	49 Q	29	70-130	30
Trichlorofluoromethane	ND	163	190	118	137	140	105	29	70-139	30
1,2-Dichloroethane	ND	163	130	79	137	100	75	22	70-130	30
1,1,1-Trichloroethane	ND	163	160	99	137	120	88	30	70-130	30
Bromodichloromethane	ND	163	120	72	137	95	70	21	70-130	30
trans-1,3-Dichloropropene	ND	163	110	64 Q	137	81	59 Q	26	70-130	30
cis-1,3-Dichloropropene	ND	163	97	60 Q	137	73	53 Q	29	70-130	30
1,1-Dichloropropene	ND	163	150	91	137	110	79	31 Q	70-130	30
Bromoform	ND	163	83	51 Q	137	68	49 Q	20	70-130	30
1,1,2,2-Tetrachloroethane	ND	163	110	67 Q	137	93	68 Q	17	70-130	30
Benzene	ND	163	140	84	137	110	78	25	70-130	30
Toluene	1.1J Det	163	120	71	137	88	64 Q	28	70-130	30
Ethylbenzene	1.2J Det	163	110	64 Q	137	76	56 Q	32 Q	70-130	30
Chloromethane	ND	163	140	88	137	120	84	22	52-130	30

* % RPD not calculated due to significant difference in spk Amt

1/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2432791
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: B8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2432791-22	Analysis Date	: 06/15/24 17:05
Matrix Spike	: WG1935264-6	MS Analysis Date	: 06/15/24 19:48
Matrix Spike Dup	: WG1935264-7	MSD Analysis Date	: 06/15/24 20:15

243

Parameter	Sample Conc. (ug/kg)	Matrix Spike Sample Spike Added (ug/kg)	Matrix Spike Sample Spike Conc. (ug/kg)	Matrix Spike Sample %R	Matrix Spike Duplicate Spike Added (ug/kg)	Matrix Spike Duplicate Spike Conc. (ug/kg)	Matrix Spike Duplicate %R	RPD	Recovery Limits	RPD Limit
Bromomethane	ND	163	130	80	137	97	71	29	57-147	30
Vinyl chloride	ND	163	190	114	137	140	105	25	67-130	30
Chloroethane	ND	163	190	118	137	150	110	25	50-151	30
1,1-Dichloroethene	ND	163	170	105	137	130	94	29	65-135	30
trans-1,2-Dichloroethene	ND	163	170	104	137	130	92	29	70-130	30
Trichloroethene S	ND	163	130	80	137	95	69 Q	32 Q	70-130	30
1,2-Dichlorobenzene JJJ	ND	163	60	36 Q	137	44	32 Q	31 Q	70-130	30
1,3-Dichlorobenzene FFF	ND	163	62	38 Q	137	43	32 Q	35 Q	70-130	30
1,4-Dichlorobenzene HHH	ND	163	59	36 Q	137	42	30 Q	34 Q	70-130	30
Methyl tert butyl ether	ND	163	190	116	137	150	107	25	66-130	30
p/m-Xylene RRR	5.9 D,T	326	200	59 Q	274	140	50 Q	33 Q	70-130	30
o-Xylene SSS	1.1J D,T	326	190	57 Q	274	140	50 Q	31 Q	70-130	30
cis-1,2-Dichloroethene	ND	163	130	77	137	97	71	25	70-130	30
Dibromomethane RR	ND	163	120	72	137	94	69 Q	23	70-130	30
Styrene FF	ND	326	160	49 Q	274	110	41 Q	35 Q	70-130	30
Dichlorodifluoromethane	ND	163	130	80	137	100	74	25	30-146	30
Acetone	ND	163	150	89	137	120	85	23	54-140	30
Carbon disulfide G	ND	163	150	94	137	110	81	32 Q	59-130	30
2-Butanone M	ND	163	110	65 Q	137	84	62 Q	23	70-130	30
Vinyl acetate HH	ND	163	27	16 Q	137	21	15 Q	27	70-130	30
4-Methyl-2-pentanone Y	ND	163	91	56 Q	137	60	44 Q	40 Q	70-130	30
1,2,3-Trichloropropane XX	ND	163	110	70	137	92	67 Q	22	68-130	30

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2/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	**Lab Number**	: L2432791
Project Name	: ELMWOOD PRESERVE	**Project Number**	: 3858.0004Y000
Client Sample ID	: B8_0.2-2	**Matrix (Level)**	: SOIL (LOW)
Lab Sample ID	: L2432791-22	**Analysis Date**	: 06/15/24 17:05
Matrix Spike	: WG1935264-6	**MS Analysis Date**	: 06/15/24 19:48
Matrix Spike Dup	: WG1935264-7 2+3	**MSD Analysis Date**	: 06/15/24 20:15

Parameter	Sample Conc. (ug/kg)	Matrix Spike Sample Spike Added (ug/kg)	Matrix Spike Sample Spike Conc. (ug/kg)	Matrix Spike Sample %R	Matrix Spike Duplicate Spike Added (ug/kg)	Matrix Spike Duplicate Spike Conc. (ug/kg)	Matrix Spike Duplicate %R	RPD	Recovery Limits	RPD Limit
2-Hexanone Z	ND	163	51	31 Q	137	28	20 Q	58 Q	70-130	30
Bromochloromethane PP	ND	163	110	69 Q	137	87	63 Q	25	70-130	30
2,2-Dichloropropane OO	ND	163	170	102	137	120	88	31 Q	70-130	30
1,2-Dibromoethane TT	ND	163	100	62 Q	137	82	60 Q	21	70-130	30
1,3-Dichloropropane SS	ND	163	120	73	137	95	69	23	69-130	30
1,1,1,2-Tetrachloroethane UU	ND	163	100	63 Q	137	80	58 Q	26	70-130	30
Bromobenzene WW	ND	163	71	44 Q	137	56	41 Q	24	70-130	30
n-Butylbenzene III	ND	163	76	46 Q	137	41	30 Q	59 Q	70-130	30
sec-Butylbenzene EEE	ND	163	88	54 Q	137	53	39 Q	50 Q	70-130	30
tert-Butylbenzene CCC	ND	163	89	54 Q	137	57	42 Q	44 Q	70-130	30
o-Chlorotoluene ✓	ND	163	86	53 Q	137	60	44 Q	35 Q	70-130	30
p-Chlorotoluene ✓	ND	163	75	46 Q	137	54	39 Q	34 Q	70-130	30
1,2-Dibromo-3-chloropropane MM	ND	163	80	49 Q	137	63	46 Q	23	68-130	30
Hexachlorobutadiene LLL	ND	163	45	28 Q	137	20	15 Q	76 Q	67-130	30
Isopropylbenzene VV	ND	163	99	61 Q	137	68	49 Q	38 Q	70-130	30
p-Isopropyltoluene GGG	ND	163	74	45 Q	137	45	33 Q	50 Q	70-130	30
Naphthalene MMM	ND	163	44	27 Q	137	34	25 Q	25	70-130	30
Acrylonitrile GGG	ND	163	72	44 Q	137	63	46 Q	14	70-130	30
n-Propylbenzene YY	ND	163	92	57 Q	137	61	44 Q	41 Q	70-130	30
1,2,3-Trichlorobenzene NNN	ND	163	34	21 Q	137	23	16 Q	40 Q	70-130	30
1,2,4-Trichlorobenzene KKK	ND	163	36	22 Q	137	24	18 Q	40 Q	70-130	30
1,3,5-Trimethylbenzene AAA	ND	163	84	52 Q	137	57	41 Q	39 Q	70-130	30

✓*

3/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2432791
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: B8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2432791-22	Analysis Date	: 06/15/24 17:05
Matrix Spike	: WG1935264-6	MS Analysis Date	: 06/15/24 19:48
Matrix Spike Dup	: WG1935264-7 2+3	MSD Analysis Date	: 06/15/24 20:15

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
1,2,4-Trimethylbenzene DDD	ND	163	77	47 Q	137	53	39 Q	36 Q	70-130	30
1,4-Dioxane	ND	8160	7200	88	6840	6300	92	13	65-136	30
p-Diethylbenzene ✓	ND	163	65	40 Q	137	38	28 Q	52 Q	70-130	30
p-Ethyltoluene ✓	ND	163	81	50 Q	137	54	39 Q	40 Q	70-130	30
1,2,4,5-Tetramethylbenzene A2	ND	163	54	33 Q	137	34	25 Q	44 Q	70-130	30
Ethyl ether LLLL	ND	163	140	87	137	110	81	25	67-130	30
trans-1,4-Dichloro-2-butene YYYY	ND	163	76	47 Q	137	55	40 Q	32 Q	70-130	30

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4|4

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FM

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1935264 -3/4	LL	145	137	66-130			All	J (all) / P ND

LDC #:60943N

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	5/15/2024	A	0.242	0.242	0.258	0.258	16.44	16.44
	VOA110		CC	0.688	0.688	0.719	0.719	7.85	7.85
			BB	0.600	0.600	0.634	0.634	3.02	3.02

LDC # 60943

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv VOA 110	6/15/24 0856	A	0.258	0.241	0.241	6.6	6.6
			CC	0.719	0.704	0.708	1.5	1.5
			BB	0.634	0.663	0.663	4.6	4.6

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 N

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.975	100	100	0
1,2-Dichloroethane-d4		24.052	120	120	
Toluene-d8		20.249	101	101	
4-Bromofluorobenzene	↓	21.785	109	109	↓

LDC # 60943 N

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 2 + 3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	163	137	ND	170	130	105	105	94	94	29	27
Trichloroethene	↓	↓	↓	130	95	80	80	69	69	32	31
Benzene				140	110	87	84	78	78	25	24
Toluene			1.1	120	88	71	71	64	64	28	31
Chlorobenzene			ND	90	68	55	55	49	49	29	28

LDC # 60943N

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1935264 - LCS 10

Compound	SA (ug/L)		SSC (ng/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	45.805	41.103	114	114	103	103	10	10
Trichloroethene			40.509	40.191	101	101	100	100	1	1
Benzene			40.524	39.414	101	101	98	98	3	3
Toluene			39.414	37.483	98	98	94	94	4	4
Chlorobenzene			39.053	37.405	98	98	94	94	4	4

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

#1 EE

Concentration = $\frac{(4996)\ (20)\ (5.0)}{(92349)\ (1.336)\ (4.0)\ (0.83)}$

1.219 ug/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume VOA 110

4.0g %s = 83

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	EF	1.219 ≈ 1.2	1.2	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: CP
2nd Reviewer: CP

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%D ≤ 20, r ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_06112024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	lcs 10
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B8_0.2-2	L2432791-22		Soil	06/11/2024	Category B
2	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
3	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B

Notes:

WG1935010-1		

LDC #: 60943

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/17/24	CCV - JULIET	MMM	58.4		All	J/NJ/Δ
	1216		T	25		↓	↓
			II	23.9		↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 25 ug/ml std)	Recalculated (RRF 25 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL Juliet	4/4/2024	A	1.460	1.460	1.419	1.419	5.48	5.48
			S	1.006	1.006	0.969	0.969	5.84	5.84
			GG	1.024	1.024	1.004	1.004	6.22	6.22
			UU	0.999	0.999	0.958	0.958	9.01	9.01
			DDD	1.214	1.214	1.221	1.221	1.79	1.79
			JJJ	1.090	1.090	1.019	1.019	13.54	13.54

LDC # 60943N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound,
Ais = Area of associated internal stanc
Cis = Concentration of internal standa

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv Juliet	6/17/24 1216	A	1.419	1.497	1.497	5.5	5.5
			S	0.969	0.938	0.938	3.2	3.2
			GG	1.004	1.027	1.027	2.3	2.3
			UU	0.958	0.971	0.971	1.4	1.4
			DDD	1.221	1.239	1.239	1.5	1.5
			JJJ	1.019	1.134	1.134	11.3	11.3

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943N

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	19.540	78	78	0
2-Fluorobiphenyl	↓	18.048	72	72	
Terphenyl-d14	↓	18.251	73	73	↓
Phenol-d5	50.0	37.584	75	75	
2-Fluorophenol	↓	34.906	70	70	
2,4,6-Tribromophenol	↓	30.021	60	60	↓

LDC # 60943 N

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

Sample: 2 + 3

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1560	1560	ND	1086.17	1061.38	70	70	70	68	0	2.3
N-Nitroso-di-n-propylamine				1193.14	1234.38	77	76	77	79	0	3.4
4-Chloro-3-methylphenol				1236.65	1221.95	77	79	77	78	0	1.2
Acenaphthene				1093.94	1090.36	70	70	70	70	0	0.3
Pentachlorophenol				1145.42	1161.57	70	73	77	74	9	1.4
Pyrene				1238.37	1228.83	77	79	77	79	0	0.8

LDC # 60943 N

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG193501 0 - 2/3

Compound	SA ( )		SSC ( )		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	31.717	30.875	79	79	77	77	3	2.7
N-Nitroso-di-n-propylamine	↑	↑	33.558	33.402	84	84	84	84	0	0.5
4-Chloro-3-methylphenol			34.966	33.093	87	87	83	83	5	5.5
Acenaphthene			28.962	30.338	72	72	76	76	5	4.6
Pentachlorophenol			30.344	28.198	76	76	70	70	8	7.3
Pyrene	↓	↓	34.112	35.023	85	85	88	88	3	2.6

LDC #: 60943 N

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

WG1935010-2 (LCS) A

Final Conc = Conc *Vp*DF / VS

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

$$\text{Concentration} = \frac{(95461)(40.0)(1)(1000)}{(84841)(1.419)(30.31)}$$

$$= 1046.43 \text{ ug/kg}$$

Sample #	Analyte	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
LCS	A	1046.43	1000	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAJ
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r^2 ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06112024
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL≤samples≤RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B12_0.2-2 x2 dil	L2432791-06		Soil	06/11/2024	Category B
2	B8_0.2-2	L2432791-22		Soil	06/11/2024	Category B
3	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
4	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B

Notes:

1 WG1934962-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	06/17/24	WG1935124-2	2	Chlordane	20.1	ALL, MB1 (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1 (DET)	Heptachlor Epoxide	67	JDET/A
		cis-Chlordane	113	↓
		trans-Chlordane	41	

Comments:_____

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDE (CLP1)	1.316	1.316	1.381	1.381	16.23	16.23
			4,4'-DDE (CLP2)	1.232	1.232	1.211	1.211	5.86	5.86

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935124-1 PEST15	06/17/24	Dieldrin (CLP1)	1.322	1.414	1.414	7.0	7.0
			Dieldrin (CLP2)	1.156	1.285	1.285	11.2	11.2
			4,4'-DDE (CLP1)	1.381	1.324	1.324	4.1	4.1
			4,4'-DDE (CLP1)	1.211	1.232	1.232	1.7	1.7

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935124-4 PEST15	06/17/24	Dieldrin (CLP1)	1.322	1.449	1.449	9.6	9.6
			Dieldrin (CLP2)	1.156	1.285	1.291	11.2	11.2
			4,4'-DDE (CLP1)	1.381	1.369	1.369	0.9	0.9
			4,4'-DDE (CLP1)	1.211	1.257	1.257	3.8	3.8

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	34.351	69	69	0
Tetrachloro-m- xylene	RTX-CLP2	50	40.493	81	81	0
Decachlorobiphenyl	RTX-CLP1	50	39.091	78	78	0
Decachlorobiphenyl	RTX-CLP2	50	44.543	89	89	0

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	39.2	38.5	0	27.1	33.5	69	69	87	87	21	21
4,4'-DDD	39.2	38.5	0	26.2	31.8	67	67	83	83	19	19

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1934962-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	31.80	32.50	26.80	25.70	84	84	79	79	6	6
4,4'-DDD	31.80	32.50	26.40	24.30	83	83	75	75	10	10

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	1.584E+09	1.394E+08	25	1.211	10.00	15.21	2.00	88	**350**	**352**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV ≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06112024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No result <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B8_0.2-2	L2432791-22		Soil	06/11/2024	Category B
2	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
3	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B

Notes:

1 WG1935382-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943N

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest 23	8/25/2023	1260-1 (CLP1)	0.067	0.067	0.062	0.062	15.68	15.72
			1260-1 (CLP2)	0.057	0.057	0.053	0.053	12.18	12.22

LDC#: 60943N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935168-2	06/17/24	1260-1 (CLP1)	0.062	0.055	0.055	11.3	11.5
			1260-1 (CLP2)	0.053	0.050	0.050	5.7	5.7

LDC # _60943N

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	273.073	55	55	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	290.928	58	58	0
Decachlorobiphenyl	RTX-CLP1	500.00	274.191	55	55	0
Decachlorobiphenyl	RTX-CLP2	500.00	294.596	59	59	0

LDC # _60943N

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	356	344	0	215	207	60	60	60	60	4	4

LDC # _60943N

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1935382-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	310	306	200	208	65	65	68	68	5	5

LDC # _60943N

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	4.591E+08	988700000	250	0.062	5.00	10.09	1.00	N/A	**1868.063**	1863.236	0
	1260-Total =	(1863.236+1989.985+1939.164+2213.286+2099.547)						conc =	(2023)(5mL)		**final conc**	
			5						(10.09g) (5mL)		**(ug/Kg)**	
	=	2021.04						=	**195**		195	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A /A	
II	Initial Calibration/ ICV	A/ A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	Y.D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06112024 from same SDG
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	~~Dup=~~
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1 1	B12_0.2-2	L2432791-06		Soil	06/11/2024	Category B
2	B8_0.2-2	L2432791-22		Soil	06/11/2024	Category B
3	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
4	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B

Notes:

1 WG1934844-1		
2 WG1934881-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	4/12/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935103-3	06/18/24	2,4-D (CLP1)	0.240	0.241	0.241	0.4	0.4
	PEST22		2,4-D (CLP2)	0.237	0.230	0.230	3.1	3.1

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935104-2	06/17/24	2,4-D (CLP1)	0.132	0.128	0.128	3.0	3.0
	PEST16		2,4-D (CLP2)	0.217	0.234	0.234	7.8	7.8

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.405	81	81	0
DCAA	RTX-CLP2	0.500	0.425	85	85	0

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	200	200	0	191	173	96	96	86	87	10	10

LDC# 60943N

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1934844-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	163	121	127	74	74	78	78	5	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	2.830E+08	7.068E+08	0.250	0.240	1.00	30.81	1.00	NA	**135**	**135**	0
WG1934881-2												

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2432791
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B12_0.2-2	L2432791-06	Metals, Wet Chemistry
B8_0.2-2	L2432791-22	Metals, Wet Chemistry
B8_0.2-2MS	L2432791-22MS	Metals, Wet Chemistry
B8_0.2-2MSD	L2432791-22MSD	Metals, Wet Chemistry
B8_0.2-2DUP	L2432791-22DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06112024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 11, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	1.06 mg/Kg	5.300 mg/Kg	B12_0.2-2 B8_0.2-2
ICB/CCB	Antimony Beryllium Cadmium Thallium	0.00796 mg/L 0.000617 mg/L 0.00121 mg/L 0.00423 mg/L	1.592 mg/Kg 0.1234 mg/Kg 0.242 mg/Kg 0.846 mg/Kg	B12_0.2-2 B8_0.2-2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06112024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06112024	Iron Thallium	0.0419 mg/L 0.00018 mg/L	0.2095 mg/Kg 0.0009 mg/Kg	B12_0.2-2 B8_0.2-2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06112024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
B8_0.2-2MS/MSD	Arsenic	-	228	J (all detects)
(B12_0.2-2	Chromium	-	140	J (all detects)
B8_0.2-2)	Lead	-	167	J (all detects)
	Potassium	0	57	J (all detects)
	Zinc	74	128	J (all detects)

For B8_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤20)	Validation Action
B8_0.2-2MS/MSD	Arsenic	32	J (all detects)
(B12_0.2-2	Lead	24	J (all detects)
B8_0.2-2)	Potassium	31	J (all detects)
	Zinc	23	J (all detects)

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

All criteria were met.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
B12_0.2-2 B8_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06112024
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B12_0.2-2 2x, all except Hg (matrix)	L2432791-06		Soil	06/11/2024	Category B
2	B8_0.2-2 ↓	L2432791-22		Soil	06/11/2024	Category B
3	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
4	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe	1.06		5.300					
Sb		0.00796	1.592					
Be		0.000617	0.1234					
Cd		0.00121	0.242					
Tl		0.00423	0.846					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/11/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06112024							
Fe	0.0419	0.2095						
Tl	0.00018	0.0009						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943N_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	As		228	75-125			All	Jdet/A	Det
		Cr		140	75-125			All	Jdet/A	Det
		Pb		167	75-125			All	Jdet/A	Det
		K	0	57	75-125			All	J/UJ/A	Det
		Zn	74	128	75-125			All	J/UJ/A	Det
3-4	soil	As				32	20	All	J/UJ/A	Det
		Pb				24	20	All	J/UJ/A	Det
		K				31	20	All	J/UJ/A	Det
		Zn				23	20	All	J/UJ/A	Det

Comments: **3-4: multiple analytes >4x, %R, RPD**

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Ba	0.497	0.500	99.4	99	Y
CCV	ICP	Ni	0.507	0.500	101.4	101	Y
LLCC	ICP						
ICSAB	ICP	Mg	484	500	96.8	97	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	96	Y
CCV	CVAA	Hg	0.01	0.0100	100	100	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1935273 LCS	LCS	Ba	162	160.0	101.25	101	Y
3	MS	Cr	16.9	19.2	88.02083333	88	Y
4	Duplicate	Mg	6210	5290	16	16	Y
2 PS	PDS	As	10.2	10.9	93.57798165	94	Y
2 SD	Serial dilution	V	36.7	35.6	3.08988764	3	Y

VALIDATION FINDINGS CHECKLIST

Sample Calculation Verification

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Ca	6.2869	2	1.277	50	88	562	559.4521962	Y
2	Ag	0.0065	2	1.331	50	83	0.584	0.588379061	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943N
SDG #: L2432791
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_06112024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<AD samples<RL, no dil'n.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B12_0.2-2	L2432791-06		Soil	06/11/2024	Category B
2	B8_0.2-2	L2432791-22		Soil	06/11/2024	Category B
3	B8_0.2-2MS	L2432791-22MS	MS	Soil	06/11/2024	Category B
4	B8_0.2-2MSD	L2432791-22MSD	MSD	Soil	06/11/2024	Category B
5	↓ Dup	↓ Dup	Dup	↓	↓	↓

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1-2	CN-
1-2	Cr(VI)
QC	
3-4	CN-
3-5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	-0.01095	0.999950	1.0000	Y
		s2	0.2	0.16689			
		s3	0.5	0.45284			
		s4	1	0.82129			
		s5	2	1.64942			
		s6	5	4.17576			
		s7	10	8.29279			
		s8	25	21.2552			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10832	0.1		108.32	108	Y
Calibration verification	Cr(VI)	0.189	0.200		94.5	94	Y
Calibration verification	Cr(VI)	0.190	0.200		95	95	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1935649 LCS	LCS	Cr(VI)	186	192	96.875	97	Y
3	MS	CN-	12	12	100	100	Y
4	Duplicate	CN-	12	12	0	0	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	0.09783	1	1.0903	50	88	1.0 U	0.101963179	Y
2	Cr(VI)	0.00	1	2.4061	100	83	0.964 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2433398
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B4_0-0.2	L2433398-05	Pesticide, Herbicide
C3_0.2-2	L2433398-10	VOC, SVOC, Pesticide, PCB, Herbicide
B4_0-0.2MS	L2433398-05MS	Pesticide, Herbicide
B4_0-0.2MSD	L2433398-05MSD	Pesticide, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06132024, FB_06132024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 13, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
03/27/24	ICV-VOA117	Dichlorodifluoromethane	30.7	C3_0.2-2	UJ (all non-detects)
		Carbon disulfide	33.0		UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/18/24	CCV-VOA117	Chloromethane	20.4	C3_0.2-2	J (all detects)
		Bromomethane	75.3		UJ (all non-detects)
		Chloroethane	21.6		
		Acetone	81.5		
		1,1-Dichloroethane	21.1		
		Acrylonitrile	31.8		
		2-Butanone	22.1		
		1,2-Dichloroethane	24.7		
		1,2-Dichloropropane	21.7		
		4-Methyl-2-pentanone	31.1		
		2-Hexanone	33.8		
		trans-1,4-Dichloro-2-butene	25.4		

All of the continuing calibration relative response factors (RRF) were within validation criteria.

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/18/24	CCV-GCMS5	Bis(2-Chloroisopropyl	34.9	C3_0.2-2	UJ (all non-detects)
		2-Nitrophenol	30.3		UJ (all non-detects)
		2,4-Dimethylphenol	39.6		UJ (all non-detects)
		Hexachlorocyclopentadiene	40.4		UJ (all non-detects)
		2-Nitroaniline	20.6		UJ (all non-detects)
		2,6-Dinitrotoluene	23.8		UJ (all non-detects)
		Di-n-octylphthalate	21		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/19/24	WG1936125-4	1	Endrin aldehyde	21.1	C3_0.2-2	UJ (all non-detects)
06/19/24	WG1936125-4	2	Endrin aldehyde	20.4	C3_0.2-2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1936524-5	Chloromethane	7.8	RL	C3_0.2-2
	Bromomethane	0.96	RL	
	Acetone	15	RL	
	2-Butanone	8.8	RL	
	Isopropylbenzene	0.40	RL	
	p-Isopropyltoluene	0.20	RL	
	Pyrrole (9.0)	2	RL	
	n-Butyl ether (9.38)	2.3	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
C3_0.2-2	Acetone	8.8 ug/Kg	11U ug/Kg
	2-Butanone	4.6 ug/Kg	11U ug/Kg
	Isopropylbenzene	0.26 ug/Kg	1.1U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06132024 for VOC analysis.

SVOC

Contamination was detected in the associated SVOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG1935035	Phenol	25 ug/Kg	RL	C3 0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06132024 for pesticide and herbicide analyses.

PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC, SVOC, PCB

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide, Herbicide

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1936524-LCS/LCSD (C3_0.2-2)	Bromomethane	24 (57-147)	30 (57-147)	UJ (all non-detects)
	4-Methyl-2-pentanone	69 (70-130)	68 (70-130)	UJ (all non-detects)
	2-Hexanone	66 (70-130)	68 (70-130)	UJ (all non-detects)
	Acrylonitrile	68 (70-130)	66 (70-130)	UJ (all non-detects)
WG1936524-LCS/LCSD (C3_0.2-2)	Acetone	181 (54-140)	-	J (all detects)

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
WG1936524-LCS/LCSD (C3_0.2-2)	Acetone	34 (≤30)	J (all detects)

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1935035-LCS/LCSD (C3_0.2-2)	p-Chloro-m-cresol	109 (26-103)	109 (26-103)	None
WG1935035-LCS/LCSD (C3_0.2-2)	Benzoic acid	-	8 (10-110)	UJ (all non-detects)

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC, SVOC, and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the PCB and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
B4_0-0.2	cis-Chlordane	139	J (all detects)
C3_0.2-2	cis-Chlordane	97	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EJ
2nd Reviewer:

Method: Volatiles (EPA 8260D)
+ TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/SW	%RSD ≤ 20, 1X ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB= TB_06132024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS LP
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = J/U
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B

Notes:

35

WG1936524-5 Blank		

LDC #: 60943O

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 30 and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓		✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓	✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 609430

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%(30%))	Associated samples	Qualifications
	3/27/24	ICV- VOA117	JJ	30.7	all	J/UJ/A ND
	0719		G	33.0	↓	↓

	DOD	NFG
%D	20%	30%

LDC #: 609430

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/18/24 0947	CCV-VOA117	A	20.4		All	J/UJ/A ND+DL
			B	75.3			
			D	21.6			
			F	81.5			
			I	21.1			
			GGGG	31.8			
			M	22.1			
			L	24.7			
			Q	21.7			
			Y	31.1			
			Z	33.8			
			YYYY	25.4			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943O

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/18/24 **Associated samples:** All
Conc. units: ug/kg

Compound	Blank ID	Sample Identification							
	MB1		1						
A	7.8								
B	0.96								
F	15		8.8 /1U						
M	8.8		4.6 /1U						
YY	0.40		0.26 /1.1U						
GGG	0.20								
TIC Pyrrole	2 (9.0)								
n-Butyl ether	2.39 (9.38)								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 609430

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: [illegible]

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1936524 - LCS 1P	B	24	30	57-147			All	J/UJ/P NP
	F	181		54-140				J/UJ/P Det
	F				34	30		J/UJ/P Det
	Y	69	68	70-130				J/UJ/P ND
	Z	66	68	↓				
	GGGG	68	~~68~~ 66	↓			↓	↓ ↓

LDC #:60943O

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	3/26/2024	V	0.903	0.903	0.889	0.889	9.82	9.82
	VOA117		CC	0.759	0.759	0.755	0.755	9.93	9.93
			BB	0.458	0.458	0.457	0.457	6.62	6.62

LDC # 609430

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA117	6/18/24 0947	V	0.889	0.820	0.820	7.8	7.8
			CC	0.755	0.715	0.715	5.3	5.3
			BB	0.457	0.394	0.394	13.8	13.8

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943O

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.365	102	102	0
1,2-Dichloroethane-d4	↓	16.782	84	84	↓
Toluene-d8		18.781	94	94	
4-Bromofluorobenzene		18.511	93	93	

LDC # 609430

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG193652 4 - lcs ID

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	40.886	38.786	102	102	97	97	5	5.3
Trichloroethene			37.335	35.931	93	93	90	90	3	3.8
Benzene			36.913	35.833	92	92	90	90	2	3.0
Toluene			37.894	36.530	95	95	91	91	4	3.7
Chlorobenzene			38.663	37.374	97	97	93	93	4	3.4

LDC #: 609438

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliliters (mL)
Vp = Purge Volume

Concentration = $\frac{(4481)(20)(5)}{(310030)(0.068)(5.6)(0.82}$

= 4.628 ug/kg

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
1	M	4.628	~~0~~ 4.6	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)
+ TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A /Δ	
II	GC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	A /Δ	% RSD ≤ 20, r ICV ≥ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Surrogate Spikes	Δ	
VIII	Matrix Spike/Matrix Spike Duplicate	N	C>
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	Δ	
XII	Target Analyte Quantitation	Δ	Result < RL > MDL = J/UJ
XIII	Target Analyte Identification	Δ	
XIV	Overall Assessment of Data	Δ	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B

Notes:

WG1935035		

LDC #: 609430

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 609430

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/18/24 20:16	CCV - GCMS5	M MM	34.9		All	J/UJ/A ND
			N	30.3		↓	↓
			O	39.6			
			X	40.4			
			BB	20.6			
			EE	23.8			
			FFF	21			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 609430

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/18/24 **Associated samples:** All (ND)
Conc. units: ug/Kg Extraction: 6/16/24

Compound	Blank ID	Sample Identification							
	MB1								
A	25								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1935035-2 LCSD	* PPP	109	109 8	26-103 10-110			All ↓	J dw/p ND J/UJ/p ↓
	* p-chloro-m-cresol							

LDC #:60943O

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL GCMS5	2/6/2024	A	1.473	1.473	1.477	1.477	2.38	2.38
			S	1.059	1.059	1.053	1.053	6.78	6.78
			GG	1.077	1.077	1.070	1.070	4.77	4.77
			UU	1.064	1.064	1.076	1.076	7.84	7.84
			DDD	1.272	1.272	1.275	1.275	9.27	9.27
			JJJ	1.160	1.160	1.186	1.186	7.70	7.70

LDC # 60943 O

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV GCMS5	6/18/24 2016	Δ	1.477	1.371	1.371	7.2	7.2
			S	1.053	0.963	0.963	8.5	8.5
			GG	1.070	1.01	1.01	5.6	5.6
			UU	1.076	0.951	0.95	11.6	11.6
			PDD	1.276	1.184	1.184	7.1	7.1
			WJ	1.186	1.168	1.168	1.5	1.5

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943O

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/ml	Surrogate Found (ug/ml	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	11.061	44	44	0
2-Fluorobiphenyl	↓	19.584	78	78	
Terphenyl-d14	↓	17.818	71	71	↓
Phenol-d5	50.0	38.797	77	77	
2-Fluorophenol	↓	37.911	76	76	
2,4,6-Tribromophenol	↓	47.463	95	95	↓

LDC # 60943O

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG193503S - LCS 10

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	34.669	35.240	87	87	88	88	1	1.6
N-Nitroso-di-n-propylamine			37.660	38.924	94	94	97	97	3	3.3
4-Chloro-3-methylphenol			43.470	43.730	109	109	109	109	0	0.6
Acenaphthene			36.820	36.342	92	92	91	91	1	1.3
Pentachlorophenol			43.483	42.201	109	109	106	106	3	3.0
Pyrene	↓	↓	38.451	37.872	96	96	95	95	1	1.5

LDC #: 60943O

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

#1 YY

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(151797)(40.0)(1)(1000)}{(162479)(1.251)(30.39)(0.82}$

119.88 ug/kg

GCMS5

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
1	YY	119.88	120	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer: CL

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD≤20%. ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06132024 from same SDG
VI	Surrogate Spikes / IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL≤samples<RL, J(det)/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B4_0-0.2	L2433398-05		Soil	06/13/2024	Category B
2	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B
3	B4_0-0.2MS	L2433398-05MS	MS	Soil	06/13/2024	Category B
4	B4_0-0.2MSD	L2433398-05MSD	MSD	Soil	06/13/2024	Category B

Notes:

1 WG1935086-1		
2 WG1935042-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/19/24	WG1936125-4	1	Endrin Aldehyde	21.1	2, MB2 (ND)	J/UJ/A
			2	Endrin Aldehyde	20.4		

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1 (DET)	cis-Chlordane	139	JDET/A
				↓
	2 (DET)	cis-Chlordane	97	↓

Comments:_____

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDE (CLP1)	1.316	1.316	1.381	1.381	16.23	16.23
			4,4'-DDE (CLP2)	1.232	1.232	1.211	1.211	5.86	5.86

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935735-4 PEST15	06/18/24	Dieldrin (CLP1)	1.322	1.417	1.417	7.2	7.2
			Dieldrin (CLP2)	1.156	1.284	1.284	11.1	11.1
			4,4'-DDE (CLP1)	1.381	1.337	1.338	3.2	3.2
			4,4'-DDE (CLP2)	1.211	1.245	1.245	2.8	2.8

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	35.746	71	71	0
Tetrachloro-m- xylene	RTX-CLP2	50	39.938	80	80	0
Decachlorobiphenyl	RTX-CLP1	50	32.762	66	66	0
Decachlorobiphenyl	RTX-CLP2	50	32.295	65	65	0

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	44.2	43.2	1.37	36.6	37.1	80	80	83	83	1	1
4,4'-DDD	44.2	43.2	0	35.6	36.2	81	81	84	84	2	2

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1935036-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.40	31.40	27.10	26.10	84	84	83	83	1	1
4,4'-DDD	32.40	31.40	26.40	25.40	81	81	81	81	1	0

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
2	4,4'-DDE	5.991E+08	9.822E+07	25	1.156	10.00	15.21	1.00	82	**106**	**110**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MA
2nd Reviewer: CL

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20%. ICV ≤ 20%.
III	Continuing Calibration	A	%D ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B

Notes:

1 WG1935045-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943O

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/12/2024	1260-1 (CLP1)	0.058	0.058	0.055	0.055	2.68	2.90
			1260-1 (CLP2)	0.048	0.048	0.049	0.049	4.36	4.46

LDC#: 60943O

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

Where:

ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

Ax = Area of compound,

Cx = Concentration of compound,

Ais = Area of associated internal standard

Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935192-1	06/17/24	1260-1 (CLP1)	0.055	0.056	0.056	1.8	1.3
			1260-1 (CLP2)	0.049	0.049	0.049	0.0	0.0

LDC # _60943O

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	354.556	71	71	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	389.208	78	78	0
Decachlorobiphenyl	RTX-CLP1	500.00	330.543	66	66	0
Decachlorobiphenyl	RTX-CLP2	500.00	360.848	72	72	0

LDC # _60943O

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1935045-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	309	289	246	239	80	80	83	83	4	4

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	1.494E+08	247700000	250	0.055	5.00	10.11	1.00	N/A	**2727.418**	2725.782	0
	1260-Total =	(2725.782+2644.278+2389.176+2413.292+2260.203)						conc =	(2486)(5mL)		**final conc**	
			5						(10.11g) (5mL)		**(ug/Kg)**	
	=	2486.55						=	**246**		246	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MA
2nd Reviewer: CV

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06132024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B4_0-0.2	L2433398-05		Soil	06/13/2024	Category B
2	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B
3	B4_0-0.2MS	L2433398-05MS	MS	Soil	06/13/2024	Category B
4	B4_0-0.2MSD	L2433398-05MSD	MSD	Soil	06/13/2024	Category B

Notes:

1 WG1936057-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	4/12/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935685-8	06/20/24	2,4-D (CLP1)	0.132	0.139	0.139	5.3	5.3
			2,4-D (CLP2)	0.217	0.252	0.252	16.1	16.1

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.494	99	99	0
DCAA	RTX-CLP2	0.500	0.497	99	99	0

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	219	219	0	194	191	89	89	87	87	2	2

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1936057-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	166	163	157	150	95	95	92	92	3	3

LDC# 60943O

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	2.208E+08	8.773E+08	0.250	0.132	1.00	30.21	1.00	NA	**158**	**157**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2433398
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B4_0-0.2	L2433398-05	Metals, Wet Chemistry
C3_0.2-2	L2433398-10	Metals, Wet Chemistry
B4_0-0.2MS	L2433398-05MS	Metals, Wet Chemistry
B4_0-0.2MSD	L2433398-05MSD	Metals, Wet Chemistry
B4_0-0.2DUP	L2433398-05DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks:	FB_06132024
Field Duplicate pair:	None Associated

The above-listed soil samples were collected on June 13, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron Sodium	2.77 mg/Kg 2.07 mg/Kg	13.850 mg/Kg 10.350 mg/Kg	B4_0-0.2 C3_0.2-2
ICB/CCB	Iron	0.0101 mg/L	2.020 mg/Kg	B4_0-0.2 C3_0.2-2
ICB/CCB	Sodium	0.0346 mg/L	6.92 mg/Kg	B4_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
B4_0-0.2	Sodium	37.6 mg/Kg	213U mg/Kg
C3_0.2-2	Sodium	31.0 mg/Kg	190U mg/Kg

Contamination was detected in the field blank sample FB_06132024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06132024	Aluminum Barium	0.00438 mg/L 0.00018 mg/L	0.0219 mg/Kg 0.0009 mg/Kg	B4_0-0.2 C3_0.2-2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06132024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
B4_0-0.2MS/MSD	Antimony	72	73	J (all detects)
(B4_0-0.2	Calcium	63	-	UJ (all non-detects)
C3_0.2-2)	Chromium	71	-	
	Copper	74	-	
	Nickel	73	-	
	Potassium	66	-	
	Selenium	61	58	
	Zinc	66	-	

For B4_0-0.2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

All criteria were met.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
B4_0-0.2 C3_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NB
2nd Reviewer: CW

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB-060132024
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B4_0-0.2 2x, all except Hg (matrix)	L2433398-05		Soil	06/13/2024	Category B
2	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B
3	B4_0-0.2MS	L2433398-05MS	MS	Soil	06/13/2024	Category B
4	B4_0-0.2MSD	L2433398-05MSD	MSD	Soil	06/13/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1	2			
Fe	2.77		13.850					
Na	2.07		10.350	37.6/213U	31.0/190U			
Fe		0.0101	2.020					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
Na		0.0346	6.92	37.6/213U				

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/13/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06132024							
Al	0.00438	0.0219						
Ba	0.00018	0.0009						

Comments: The action level, when applicable, is establised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943O_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	Sb	72	73	75-125			All	J/UJ/A	Det + ND
		Ca	63		75-125			All	J/UJ/A	Det
		Cr	71		75-125			All	J/UJ/A	Det
		Cu	74		75-125			All	J/UJ/A	Det
		Ni	73		75-125			All	J/UJ/A	Det
		K	66		75-125			All	J/UJ/A	Det
		Se	61	58	75-125			All	J/UJ/A	ND
		Zn	66		75-125			All	J/UJ/A	Det

Comments: **3-4: multiple analytes >4x, %R**

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100 Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Mn	0.496	0.500	99.2	99	Y
CCV	ICP	Zn	0.475	0.500	95	95	Y
LLCC	ICP						
ICSAB	ICP	Ca	472	500	94.4	94	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.0099	0.0100	99	99	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1936264 LCS	LCS	Hg	1.74	1.67	104.1916168	104	Y
3	MS	Ag	4.38	5.33	82.17636023	82	Y
4	Duplicate	V	71.9	68	5.575411008	6	Y
1 PDS	PDS	Ni	43.5	53.2	81.76691729	82	Y
1 SD	Serial dilution	Al	13100	12500	4.8	5	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Fe	166.4386	2	1.261	50	75	17700	17598.58314	Y
2	Al	154.1634	2	1.275	50	82	14700	14745.42324	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943O
SDG #: L2433398
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer:
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_06132024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<nosamples<RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B4_0-0.2	L2433398-05		Soil	06/13/2024	Category B
2	C3_0.2-2	L2433398-10		Soil	06/13/2024	Category B
3	B4_0-0.2MS	L2433398-05MS	MS	Soil	06/13/2024	Category B
4	B4_0-0.2MSD	L2433398-05MSD	MSD	Soil	06/13/2024	Category B
5	↓ Dup	↓ Dup	Dup	↓	↓	↓

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
2	CN-
1-2	Cr(VI)
QC	
3-5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10689	0.1		106.89	107	Y
Calibration verification	Cr(VI)	0.200	0.200		100	100	Y
Calibration verification	Cr(VI)	0.204	0.200		102	102	Y

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1936099 LCS	LCS	CN-	68	72.5	93.79310345	94	Y
3	MS	Cr(VI)	1430	1650	86.66666667	87	Y
WG1936099 LCSD	Duplicate	CN-	99	94	5.18134715	5	Y

*Lab used %R for RPD calculation

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.000	1	2.5753	100	75	1.07 U	0	Y
2	CN-	0.13843	1	1.0248	50	82	1.2 U	0.164731726	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2433786
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C11_0-0.2	L2433786-07	Pesticide, Herbicide
C14_0.2-2	L2433786-17	VOC, SVOC, Pesticide, PCB, Herbicide
C11_0-0.2MS	L2433786-07MS	Pesticide, Herbicide
C11_0-0.2MSD	L2433786-07MSD	Pesticide, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06142024, FB_06142024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 14, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
04/10/24	ICAL-VOA104	1,4-Dioxane	0.00179 (≥0.005)	C14_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/20/24	CCV-VOA	Vinyl acetate	38.6	C14_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/20/24	CCV-VOA	1,4-Dioxane	0.00208 (≥0.005)	C14_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/22/24 (0057)	CCV-Juliet	Bis(2-chloroisopropyl) ether N-Nitroso-di-n-propylamine 4-Chloroaniline 4-Nitrophenol	54.4 20.9 25 23.9	C14_0.2-2	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)
06/22/24 (0145)	CCV-Juliet	1,4-Dioxane	23.6	C14_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/22/24	WG1937972-1	1	Endrin aldehyde	23.7	C11_0-0.2 C14_0.2-2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1937210-5	Methylene chloride	3.5	RL	C3_0.2-2
	Unknown (12.53)	2.73	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the trip blank sample TB_06142024 for VOC analysis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06142024 for pesticide and herbicide analyses.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC, SVOC, PCB

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (30-150)	MSD %R (30-150)	Validation Action
C11_0-0.2MS/MSD (C11_0-0.2)	Heptachlor epoxide	29	-	J (all detects)
	4,4'-DDT	0	-	J (all detects)
C11_0-0.2MS/MSD (C11_0-0.2)	delta-BHC	202	244	None

Relative percent differences (RPD) were within QC limits.

Herbicide

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1937210-LCS/LCSD (C14_0.2-2)	Vinyl acetate	61 (70-130)	38 (70-130)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
WG1937210-LCS/LCSD (C14_0.2-2)	Vinyl acetate	46 (≤30)	None

No data were qualified due to high RPD when the associated results were non-detected.

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1937194-LCS/LCSD (C14_0.2-2)	Carbazole	-	52 (54-128)	UJ (all non-detects)
	1,4-Dioxane	39 (40-140)	37 (40-140)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, PCB and herbicide analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Pesticide Analysis Reported
C11_0-0.2	5-fold dilution due to nature of sample matrix

Dilutions were not required for VOC, SVOC, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page:
Reviewer:
2nd Reviewer:

Method: Volatiles (EPA 8260D)
+ TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/A	%RSD ≤ 20, r ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB_06142024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C14_0.2-2	L2433786-17		Soil	06/14/2024	Category B

Notes:

WG1937210-5 Blank		

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20 and relative response factors (RRF) ≥ 0.05?	~~✓~~	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ~~≤ 20%~~ 30?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓	✓	
Were target analytes detected in the field duplicates?				
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 B)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	4/10/24	ICAL-VOA104	HHH		0.00179 (≥0.005)	911	J/UJ/A ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/20/24	CCV - VOA	HH	38.6		All	J/UJ/A ND
	1201		HHHH		0.00208 (≥0.005)	↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 P)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/20/24 **Associated samples:** All ND
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1								
E	3.5								
unknown	2.73 (12.53)								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FD

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1937210-	HH	61	38	70-130			All	J/UJ (P) ND
LCS ID					46	30	↓	J/UJ (P) ↓

LDC #:60943P

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	4/10/2024	V	1.137	1.137	1.007	1.007	11.52	11.52
	VOA104		CC	0.932	0.932	0.852	0.852	9.46	9.46
			MMM	2.143	2.143	2.010	2.010	5.78	5.78

LDC # 60943 P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA 104	6/20/24 1201	V	1.007	1.022	1.022	1.5	1.5
			CC	0.852	0.835	0.835	2	2
			MM M	2.010	1.986	1.986	1.2	1.2

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943P

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.761	99	99	0
1,2-Dichloroethane-d4	↓	20.312	102	102	↓
Toluene-d8		20.121	101	101	
4-Bromofluorobenzene		18.976	95	95	

LDC # 60943P

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937210-1csID

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	39.242	36.915	98	98	92	92	6	6
Trichloroethene	↓	↓	40.034	40.883	100	100	102	102	2	2
Benzene			40.582	39.164	101	101	98	98	3	3.6
Toluene			39.190	39.025	98	98	98	97	3	0.4
Chlorobenzene	V	V	40.640	40.519	102	102	101	101	1	0.3

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(667663)(20.0)}{(326731)(1.007)}$

40.585 ug/kg

Sample #	Analyte	Calculated Concentration (ug/kg	Reported Concentration (ug/kg	% Diff
LCS	V	40.585	40.582	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer: CW

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r² ICV ≤ 30 CCV ≤ 20
IV	Continuing Calibration	SW	
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	No Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C14_0.2-2	L2433786-17		Soil	06/14/2024	Category B

Notes:

WG1937194-1 Blank		

LDC #: 60943P

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/22/24 0057	ccv - Juliet	MMM	54.4		All - MB1	J/UJ/A ND
			J	20.9		↓	↓
			T	25			
			II	23.9			
	6/22/24 0145	ccv - Juliet	IIII	23.6		All - MB1	J/UJ/A ND
	6/21/24 1102	ccv - Mindy	MMM	23.6		MB1	J/UJ/A ND
			N	30.5		↓	↓
			O	32.8			
			HH	29.5			
			II	29.8			
			4,6-Dinitro-o-cresol	23.3			
			FFF	24.9		↓	↓

	DOD	NFG		
%D	20%/50%	20%	RRF: 0.001 - poor performers	0.05 - all other analytes

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 B)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1937194	WW		52	54-128			All	J/UJ/P ND
-LCS1D	IIII	39	37	40-140			↓	↓

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 25 ug/ml std)	Recalculated (RRF 25 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL Juliet	4/4/2024	A	1.460	1.460	1.419	1.419	5.48	5.48
			S	1.006	1.006	0.969	0.969	5.84	5.84
			GG	1.024	1.024	1.004	1.004	6.22	6.22
			UU	0.999	0.999	0.958	0.958	9.01	9.01
			DDD	1.214	1.214	1.221	1.221	1.79	1.79
			JJJ	1.090	1.090	1.019	1.019	13.54	13.54

LDC # 60943P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal stanc
Cis = Concentration of internal standa

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV Juliet	6/22/24 0057	Δ	1.419	1.497	1.497	5.5	5.5
			S	0.969	0.922	0.922	4.9	4.9
			GG	1.004	0.984	0.984	2	2
			HH	0.958	0.933	0.933	2.6	2.6
			DDD	1.221	1.176	1.176	3.7	3.7
			JJJ	1.019	1.096	1.096	7.6	7.6

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 P

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	19.626	79	79	0
2-Fluorobiphenyl	↓	20.199	81	81	
Terphenyl-d14	↓	20.921	84	84	↓
Phenol-d5	50.0	37.205	74	74	
2-Fluorophenol	↓	33.469	67	67	
2,4,6-Tribromophenol	↓	33.792	68	68	↓

LDC # 60943P

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1937194 LCS ID

Compound	SA (ug/mL)		SSC (ug/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	24.084	20.285	60	60	51	51	16	17.1
N-Nitroso-di-n-propylamine			24.202	20.890	60	60	52	52	14	14.7
4-Chloro-3-methylphenol			27.679	22.486	69	69	56	56	21	20.7
Acenaphthene			24.230	21.165	60	60	53	53	12	13.5
Pentachlorophenol			24.090	20.949	60	60	52	52	14	13.9
Pyrene			28.232	23.535	70	70	59	59	17	18.1

LDC #: 60943P

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG193719 4_LCS A

Concentration = $\frac{Ax\,(Is)\,(Vs)\,(DF)\,(1000)}{Ax\,(RRF)\,(Vo)\,(\%S)\,(CF)}$

$= \frac{81751\,(67659)\,(40)\,(1)\,(1000)}{81751\,(101718)\,(30.49)\,(1.273)}$

$= \frac{81751\,(67659)\,(40)\,(1)\,(1000)}{106678\,(101718)\,(30.49)\,(1.273)}$

$= 789.75$ ng/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ng/kg)	Reported Concentration (ng/kg)	% Diff
LCS	A	789.75	790	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MD
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% r^2 ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB_00142024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL < Samples < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C11_0-0.2 x5 dil.	L2433786-07		Soil	06/14/2024	Category B
2	C14_0.2-2	L2433786-17		Soil	06/14/2024	Category B
3	C11_0-0.2MS	L2433786-07MS	MS	Soil	06/14/2024	Category B
4	C11_0-0.2MSD	L2433786-07MSD	MSD	Soil	06/14/2024	Category B

Notes:

1 WG1937175-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/22/24	WG1937972-1	1	Endrin Aldehyde	23.7	ALL, MB1 (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	Heptachlor epoxide	29		30-150			1 (DET)	J/UJ/A
	4,4'-DDT	0		30-150				√ (NSDi)
	Delta-BHC	202	244	30-150				JDET/A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Calibration Date	Instrument	Compound	Standard	(Y) Response	(X) Concentration
6/12/2024	PEST15	chlordane-3 (Col 1)	1	0.028159561	0.575
			2	0.053347139	1.174
			3	0.221233231	5.149
			4	1.004911591	24.785
			5	1.804221386	39.526
			6	3.311725453	73.453
			7	7.025505717	162.438

Regression Output		*Calculated*	*Reported*
Constant	c =	*0.013881*	*0.0166*
R Squared	r2 =	*0.999314*	0.994225
X Coefficient(s)	m =	*0.0435*	*0.0436*
Correlation Coefficient		*0.999657*	
Coefficient of Determination (r^2)		*0.999314*	*0.994225*

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			chlordane-3 (CLP2)	0.043	0.043	0.043	0.043	15.47	15.33

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1937972-1 PEST15	06/22/24	Dieldrin (CLP1)	1.322	1.239	1.239	6.3	6.3
			Dieldrin (CLP2)	1.156	1.250	1.250	8.1	8.1
			Chlordane-3 (CLP2)	0.043	0.041	0.041	4.7	5.0
			Compound	Concentration (CCV)	Reported Concentration	Recalculated Concentration	Reported % D	Recalculated %D
			Chlordane-3 (CLP1)	1000	906.557	906.878	9.3	9.3

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938143-1 PEST15	06/23/24	Dieldrin (CLP1)	1.322	1.277	1.277	3.4	3.4
			Dieldrin (CLP2)	1.156	1.282	1.282	10.9	10.9
			Chlordane-3 (CLP2)	0.043	0.040	0.040	7	7
			Compound	Concentration (CCV)	Reported Concentration	Recalculated Concentration	Reported % D	Recalculated %D
			Chlordane-3 (CLP1)	1000.000	911.363	911.376	8.9	8.9

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	36.293	73	73	0
Tetrachloro-m- xylene	RTX-CLP2	50	44.138	88	88	0
Decachlorobiphenyl	RTX-CLP1	50	35.807	72	72	0
Decachlorobiphenyl	RTX-CLP2	50	42.812	86	86	0

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	54.5	55.8	51.30	92.5	107.0	76	76	100	100	15	15
4,4'-DDD	54.5	55.8	19.2	52.7	59.7	62	61	73	73	12	12

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937178-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.60	32.50	25.10	26.00	77	77	80	80	4	4
4,4'-DDD	32.60	32.50	24.40	25.30	75	75	78	78	4	4

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	chlordane-3	2.079E+07	2.027E+08	25	0.043	10.00	15.58	5.00	58	**60**	**59**	0
	chlordane-Total =	(59.030+371.584+731.885)						conc =	(387.5)(5mL)(5)		**final conc**	
		3							(15.58g) (5mL)(0.58)		**(ug/Kg)**	
	=	387.50						=	**2144**		2144	2130

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C14_0.2-2	L2433786-17		Soil	06/14/2024	Category B

Notes:

1 WG1937097-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943P

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/12/2024	1260-1 (CLP1)	0.058	0.058	0.055	0.055	2.68	2.90
			1260-1 (CLP2)	0.048	0.048	0.049	0.049	4.36	4.46

LDC#: 60943P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1937486-1	06/21/24	1260-1 (CLP1)	0.055	0.048	0.048	12.7	13.2
			1260-1 (CLP2)	0.049	0.044	0.044	10.2	10.2

LDC # _60943P

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	322.474	64	64	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	349.925	70	70	0
Decachlorobiphenyl	RTX-CLP1	500.00	365.210	73	73	0
Decachlorobiphenyl	RTX-CLP2	500.00	391.590	78	78	0

LDC # _60943P

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937097-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	297	288	193	200	65	65	70	69	7	7

LDC # _60943P

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	1.119E+08	243600000	250	0.055	5.00	10.51	1.00	N/A	**2077.208**	2074.822	0
	1260-Total =	(2074.822+2075.563+1994.728+2001.059+2005.295)						conc =	(2030)(5mL)		**final conc**	
			5						(10.51g) (5mL)		**(ug/Kg)**	
	=	2030.29						=	**193**		193	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAM
2nd Reviewer: CP

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06142024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C11_0-0.2	L2433786-07		Soil	06/14/2024	Category B
2	C14_0.2-2	L2433786-17		Soil	06/14/2024	Category B
3	C11_0-0.2MS	L2433786-07MS	MS	Soil	06/14/2024	Category B
4	C11_0-0.2MSD	L2433786-07MSD	MSD	Soil	06/14/2024	Category B

Notes:

WG1936374-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	5/21/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935685-10	06/20/24	2,4-D (CLP1)	0.132	0.143	0.143	8.3	8.3
			2,4-D (CLP2)	0.217	0.253	0.253	16.6	16.6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.520	104	104	0
DCAA	RTX-CLP2	0.500	0.464	93	93	0

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	219	219	0	194	191	89	89	87	87	2	2

LDC# 60943P

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1936374-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	165	166	154	154	95	93	93	93	1	2

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	2.144E+08	8.651E+08	0.250	0.132	1.00	30.33	1.00	NA	**155**	**154**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2433786
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C11_0-0.2	L2433786-07	Metals, Wet Chemistry
C14_0.2-2	L2433786-17	Metals, Wet Chemistry
C11_0-0.2MS	L2433786-07MS	Metals, Wet Chemistry
C11_0-0.2MSD	L2433786-07MSD	Metals, Wet Chemistry
C11_0-0.2DUP	L2433786-07DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06142024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 14, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.629 mg/Kg	3.145 mg/Kg	C11_0-0.2 C14_0.2-2
ICB/CCB	Iron	0.00966 mg/L	1.932 mg/Kg	C11_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06142024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06142024	Barium	0.00030 mg/L	0.0015 mg/Kg	C11_0-0.2
	Chromium	0.00025 mg/L	0.00125 mg/Kg	C14_0.2-2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06142024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For C11_0-0.2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

Wet Chemistry

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
C11_0-0.2MS/MSD (L2433786-07 L2433786-17)	Hexavalent chromium	64 (75-125)	46 (75-125)	UJ (all non-detects)

Relative percent differences (RPD) were not evaluated since the MS and MSD were spiked at different concentrations and not comparable.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

All criteria were met.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
C11_0-0.2	2-fold dilution due to sample matrix for all metals except mercury 10-fold dilution due to high target analyte level for mercury
C14_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A ~~SW~~	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB=FB_06142024
VII	Matrix Spike/Matrix Spike Duplicate	SW	3-4: multiple analytes >4x, %R
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C11_0-0.2 see "notes"	L2433786-07		Soil	06/14/2024	Category B
2	C14_0.2-2 2x, all except Hg (matrix)	L2433786-17		Soil	06/14/2024	Category B
3	C11_0-0.2MS	L2433786-07MS	MS	Soil	06/14/2024	Category B
4	C11_0-0.2MSD	L2433786-07MSD	MSD	Soil	06/14/2024	Category B

Notes:

1. 2x, all except Hg (matrix), Hg 10x (high analyte)		

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe	0.629		3.145					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe		0.00966	1.932					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/14/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06142024							
Ba	0.00030	0.0015						
Cr	0.00025	0.00125						

Comments: The action level, when applicable, is establised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943P_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Co	0.509	0.500	101.8	102	Y
CCV	ICP	Mg	0.495	0.500	99	99	Y
LLCC	ICP						
ICSAB	ICP	Al	499	500	99.8	100	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.003	0.0030	100	100	Y
CCV	CVAA	Hg	0.01	0.0100	100	100	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1936666 LCS	LCS	Tl	8.23	9.6	85.72916667	86	Y
3	MS	Ca	1240	1310	94.65648855	94	Y
4	Duplicate	Sb	54.9	52.8	3.899721448	4	Y
	PDS						
1 SD	Serial dilution	As	53.0	59.2	10.47297297	10	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cd	0.0153	2	1.291	50	58	2.03	2.043323807	Y
2	Ba	0.5636	2	1.266	50	88	50.5	50.58882666	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943P
SDG #: L2433786
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_061424
VI	Matrix Spike/Matrix Spike Duplicate	SW	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL< no samples<RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C11_0-0.2	L2433786-07		Soil	06/14/2024	Category B
2	C14_0.2-2	L2433786-17		Soil	06/14/2024	Category B
3	C11_0-0.2MS	L2433786-07MS	MS	Soil	06/14/2024	Category B
4	C11_0-0.2MSD	L2433786-07MSD	MSD	Soil	06/14/2024	Category B
5	↓ DUP	↓ DUP	DUP	↓	↓	↓

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
2	CN-
1-2	Cr(VI)
QC	
3-5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	Cr(VI)	64	46	75-125			All	J/UJ/A	ND

Comments: ***MS/MSD Spikes not comparable**

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	0.0033	0.999974	0.99998	Y
		s2	0.2	0.01001			
		s3	0.5	0.01868			
		s4	1	0.03671			
		s5	2	0.07097			
		s6	5	0.17729			
		s7	10	0.35375			
		s8	25	0.89457			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10397	0.1		103.97	104	Y
Calibration verification	Cr(VI)	0.203	0.200		101.5	101	Y
Calibration verification	Cr(VI)	0.205	0.200		102.5	103	Y

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1936676 LCS	LCS	CN-	75	72.5	103.4482759	104	Y
3	MS	Cr(VI)	1130	1780	63.48314607	64	Y
4	Duplicate	Cr(VI)	46	64	32.72727273	32	Y

*Lab used %R for RPD calculation

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.000	1	2.5725	100	58	1.37 U	0	Y
2	CN-	0.13295	1	1.0034	50	88	1.1 U	0.150567616	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2433800
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 2, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C13_0.2-2_P	L2433800-01	PFAS

Associated QC Samples(s):

Field/Trip Blanks: FB_06142024_P
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 14, 2024 and was analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard	Analyte	%D	Associated Samples	Validation Action
06/25/24	ISC	Perfluorododecanesulfonic acid (PFDoS)	30.6	C13_0.2-2_P	UJ (all non-detects)
		N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	38.6		UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_06142024_P for PFAS analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06142024_P	Perfluorobutanoic acid (PFBA)	2.01 ng/L	RL	C13_0.2-2_P

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
C13_0.2-2_P	Perfluorobutanoic acid (PFBA)	0.149 ng/g	0.783U ng/g

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Q
SDG #: L2433800
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: CJ
2nd Reviewer: CJ

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	LC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	A/Δ	%RSD ≤ 20 |CV| ≤ 30
IV	Continuing Calibration/ISC/~~Bile Salt~~	SW	CCV/ISC ≤ 30
V	Laboratory Blanks	Δ	
VI	Field Blank	SW	FB = FB_06142024_P
VII	Matrix spike/Matrix spike duplicates	N	MS
VIII	Laboratory Control Sample	Δ	LCS
IX	Field Duplicate	N	
X	Internal standards	Δ	
XI	Target Analyte Quantitation	Δ	Result < RL > MDL = Jdet
XII	Target Analyte Identification	Δ	
XIII	Overall Assessment of Data	Δ	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C13_0.2-2_P	L2433800-01		Soil	06/14/2024	Category B

Notes:

WG1938670-1		

LDC #: 609430

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: KJ

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			✓	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?			✓	
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were the retention time windows properly established?	✓			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	✓			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?				
Were all the retention times within the acceptance windows?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	NA	✓		
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?			✓	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) ~~between 20-150%?~~ with lab limits	✓			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	✓			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	✓			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	✓			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	✓			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
Were ion ratios between 50-150%?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFAS

A. Perfluorobutanoic acid (PFBA)	X. NMeFOSA	UU. N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
B. Perfluoropentanoic acid (PFPeA)	Y. NEtFOSA	VV. Hexafluoropropylene oxide dimer acid (HFPO-DA)
C. Perfluorohexanoic acid (PFHxA)	Z. NMeFOSAA	WW. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
D. Perfluoroheptanoic acid (PFHpA)	AA. NEtFOSAA	XX. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
E. Perfluorooctanoic acid (PFOA)	BB. NMeFOSE	YY. 1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)
F. Perfluorononanoic acid (PFNA)	CC. NEtFOSE	ZZ. 1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)
G. Perfluorodecanoic acid (PFDA)	DD. HFPO-DA (GenX)	A1. 1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)
H. Perfluoroundecanoic acid (PFUnA)	EE. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	B1. N-ethylperfluorooctane sulfonamide (NEtFOSA)
I. Perfluorododecanoic acid (PFDoA)	FF. Perfluoro-4-methoxybutanoic acid (PFMBA)	C1. N-methylperfluorooctane sulfonamide (NMeFOSA)
J. Perfluorotridecanoic acid (PFTrDA)	GG. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	D1. N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)
K. Perfluorotetradecanoic acid (PFTeDA)	HH. Perfluoro-3-methoxypropanoic acid (PFMPA)	E1. N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)
L. Perfluorobutanesulfonic acid (PFBS)	II. 9Cl-PF3ONS	F1. 3-Perfluoropropyl propanoic acid (3:3FTCA)
M. Perfluoropentanesulfonic acid (PFPeS)	JJ. 11Cl-PF3OUdS	G1. 3-Perfluoropentylpropanoic acid (5:3FTCA)
N. Perfluorohexanesulfonic acid (PFHxS)	KK. Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	H1. 3-Perfluoroheptyl propanoic acid (7:3FTCA)
O. Perfluoroheptanesulfonic acid (PFHpS)	LL. 3:3 FTCA	
P. Perfluorooctanesulfonic acid (PFOS)	MM. 5:3 FTCA	
Q. Perfluorononanesulfonic acid (PFNS)	NN. 7:3 FTCA	
R. Perfluorodecanesulfonic acid (PFDS)	OO. 3:3 Fluorotelomer carboxylate (3:3 FTCA)	
S. Perfluorododecanesulfonic acid (PFDoS)	PP. 5:3 Fluorotelomer carboxylate (5:3 FTCA)	
T. 4:2 FTS	QQ. 7:3 Fluorotelomer carboxylate (7:3 FTCA)	
U. 6:2 FTS	RR. Perfluorooctadecanoic acid (PFODA)	
V. 8:2 FTS	SS. Perfluorohexadecanoic acid (PFHxDA)	
W. Perfluorooctanesulfonamide (PFOSA)	TT. N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

LDC #: 60943Q

VALIDATION FINDINGS WORKSHEET
Continuing Calibration/Instrument Sensitivity Check

Reviewer: FT

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Date	Standard ID	Analyte	Finding %D (Limit: ≤30.0%)	Associated Sample	Qualifications
6/25/24	ISC	S	30.6	All	J/UJ/A (ND)
0653		UU	38.6	↓	↓

LDC #: Q

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Sampling date: **Associated samples:** A 11

Analyte	Blank ID (ng/L)	Sample Identification				
	FB					
A	2.01	0.149	0.780 B4 → 3			

FB= FB_06142024_P

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LCMS EPA Method 1633

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 2.32/2.5 std)	Recalculated (RRF 2.32/2.5 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	4/11/2024	PFOS	1.120	1.120	1.181	1.181	10.12	10.12
			PFOA	0.750	0.750	0.8100	0.810	9.53	9.53

LDC #: 60943Q

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD:
LC/MS/MSEPA Draft Method 1633
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF	Recalculated RRF	Reported %D	Recalculated %D
1	ccv	6/25/24	PFOA ($^{13}C_8$-PFOA)	2.5	2.166	2.166	86.7	86.6
		0706	PFOS ($^{13}C_8$-PFOS)	2.32	2.081	2.081	89.7	89.7
2			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
3			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
4			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
5			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943Q

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: _____

Method:
EPA Draft Method 1633
The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = | LCSC - LCSDC | * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: WG1938670-3 (LCS)

Compound	Spike Added (ng/g)		Spike Concentration (ng/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2.0	NA	1.71	NA	85	85				
PFOS	1.86	↓	1.56	↓	84	84				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 60943 Q

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: ___ of ___
Reviewer: _____

Method:
LC/MS/MS EPA Draft Method 1633

The concentration of the sample was calculated for the compound identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #1, PFOA:

$$\text{Conc.} = \frac{(60944)(2.5)(4)}{(816204)(0.810)(7.02)(0.73}$$

=

= 0.180 ng/g

#	Sample ID	Analyte	Reported Concentration (ng/g)	Calculated Concentration (ng/g)	Qualification
	#1	PFOA	0.180	0.180	-

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434058
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
D11_0.2-2	L2434058-02	VOC, SVOC, Pesticide, PCB, Herbicide
D7_0-0.2	L2434058-17	Pesticide, Herbicide
D11_0.2-2MS	L2434058-02MS	VOC, SVOC, Pesticide, PCB, Herbicide
D11_0.2-2MSD	L2434058-02MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06172024, FB_06172024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 17, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers with the exception listed below.

The VOC nondetect results for vinyl acetate in sample D11_0.2-2 were rejected (R) due to severely low MS/MSD percent recoveries. The results are not usable for project objectives, which may have a major impact on the data usability.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
02/20/24	ICAL-VOA126	1,4-Dioxane	0.00163 (≥0.005)	D11_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/21/24	ICV-VOA126	Dichlorodifluoromethane	35.5	D11_0.2-2	UJ (all non-detects)
		Carbon disulfide	33.9		UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/21/24	CCV-VOA126	Vinyl chloride	22.9	D11_0.2-2	UJ (all non-detects)
		Acetone	21.4		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/21/24	CCV-VOA126	1,4-Dioxane	0.0015 (≥0.005)	D11_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/23/24	CCV-Mindy	Bis(2-chloroisopropyl) ether	31.5	D11_0.2-2	UJ (all non-detects)
		2,4-Dimethylphenol	24.5		UJ (all non-detects)
		2,4-Dinitrophenol	21.3		UJ (all non-detects)
		4-Nitrophenol	24.9		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/24/24	WG1938341-1	1	Endrin aldehyde	24.5	D11_0.2-2 D7_0-0.2	UJ (all non-detects)

Herbicide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/23/24	WG1938121-2	1	2,4,5-T	26.8	D7_0-0.2	UJ (all non-detects)
06/23/24	WG1938121-2	2	2,4-D	21.5	D7_0-0.2	UJ (all non-detects)

PCB

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1937663-5	Boric acid, trimethyl ester (8.63)	23.9	RL	D11_0.2-2
	Cyclotrisiloxane, hexamethyl (14.72)	4.12	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte TIC (RT in minutes)	Level Detected	Validation Action
D11_0.2-2	Cyclotrisiloxane, hexamethyl (14.71)	3.73 ug/Kg	3.73U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06172024 and field blank sample FB_06172024 for VOC analysis.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06172024 for SVOC, pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
D11_0.2-2MS/MSD (D11_0.2-2)	Methylene chloride	61 (70-130)	61 (70-130)	J (all detects) UJ (all non-detects)
	1,1-Dichloroethane	68 (70-130)	66 (70-130)	
	Chloroform	59 (70-130)	57 (70-130)	
	Carbon tetrachloride	57 (70-130)	51 (70-130)	
	1,2-Dichloropropane	58 (70-130)	56 (70-130)	
	Dibromochloromethane	46 (70-130)	46 (70-130)	
	1,1,2-Trichloroethane	52 (70-130)	50 (70-130)	
	Tetrachloroethene	25 (70-130)	24 (70-130)	
	Chlorobenzene	27 (70-130)	27 (70-130)	
	1,2-Dichloroethane	59 (70-130)	58 (70-130)	
	1,1,1-Trichloroethane	62 (70-130)	58 (70-130)	
	Bromodichloromethane	53 (70-130)	52 (70-130)	
	trans-1,3-Dichloropropene	26 (70-130)	27 (70-130)	
	cis-1,3-Dichloropropene	20 (70-130)	21 (70-130)	
	1,1-Dichloropropene	44 (70-130)	39 (70-130)	
	Bromoform	41 (70-130)	40 (70-130)	
	1,1,2,2-Tetrachloroethane	48 (70-130)	45 (70-130)	
	Benzene	52 (70-130)	50 (70-130)	
	Toluene	34 (70-130)	33 (70-130)	
	Ethylbenzene	24 (70-130)	24 (70-130)	
	Bromomethane	39 (57-147)	40 (57-147)	
	trans-1,2-Dichloroethene	50 (70-130)	48 (70-130)	
	Trichloroethene	37 (70-130)	35 (70-130)	
	1,2-Dichlorobenzene	18 (70-130)	18 (70-130)	
	1,3-Dichlorobenzene	17 (70-130)	17 (70-130)	
	1,4-Dichlorobenzene	16 (70-130)	17 (70-130)	
	m,p-Xylene	23 (70-130)	23 (70-130)	
	o-Xylene	25 (70-130)	26 (70-130)	
	cis-1,2-Dichloroethene	52 (70-130)	51 (70-130)	
	Dibromomethane	59 (70-130)	56 (70-130)	
	Styrene	17 (70-130)	18 (70-130)	
	Carbon disulfide	43 (59-130)	41 (59-130)	
	2-Butanone	54 (70-130)	50 (70-130)	
	4-Methyl-2-pentanone	19 (70-130)	17 (70-130)	
	1,2,3-Trichloropropane	51 (68-130)	47 (68-130)	
	2-Hexanone	4 (70-130)	3 (70-130)	
	Bromochloromethane	61 (70-130)	59 (70-130)	
	2,2-Dichloropropane	65 (70-130)	62 (70-130)	
	1,2-Dibromoethane	44 (70-130)	43 (70-130)	
	1,3-Dichloropropane	50 (69-130)	49 (69-130)	
	1,1,1,2-Tetrachloroethane	38 (70-130)	39 (70-130)	

D11_0.2-2MS/MSD (D11_0.2-2)	Bromobenzene	24 (70-130)	24 (70-130)	J (all detects)
	n-Butylbenzene	10 (70-130)	10 (70-130)	UJ (all non-detects)
	sec-Butylbenzene	13 (70-130)	14 (70-130)	
	tert-Butylbenzene	16 (70-130)	17 (70-130)	
	o-Chlorotoluene	19 (70-130)	19 (70-130)	
	p-Chlorotoluene	17 (70-130)	17 (70-130)	
	1,2-Dibromo-3-chloropropane	44 (68-130)	40 (68-130)	
	Hexachlorobutadiene	7 (67-130)	9 (67-130)	
	Isopropylbenzene	20 (70-130)	20 (70-130)	
	p-Isopropyltoluene	12 (70-130)	13 (70-130)	
	Naphthalene	15 (70-130)	15 (70-130)	
	Acrylonitrile	19 (70-130)	21 (70-130)	
	n-Propylbenzene	16 (70-130)	16 (70-130)	
	1,2,3-Trichlorobenzene	12 (70-130)	12 (70-130)	
	1,2,4-Trichlorobenzene	11 (70-130)	11 (70-130)	
	1,3,5-Trimethylbenzene	17 (70-130)	18 (70-130)	
	1,2,4-Trimethylbenzene	17 (70-130)	18 (70-130)	
	p-Diethylbenzene	11 (70-130)	12 (70-130)	
	p-Ethyltoluene	15 (70-130)	16 (70-130)	
	1,2,4,5-Tetramethylbenzene	13 (70-130)	13 (70-130)	
	trans-1,4-Dichloro-2-butene	6 (70-130)	7 (70-130)	
D11_0.2-2MS/MSD (D11_0.2-2)	Vinyl acetate	0 (70-130)	0 (70-130)	R (all non-detects)

Relative percent differences (RPD) were within QC limits.

SVOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
D11_0.2-2MS/MSD (D11_0.2-2)	Hexachlorocyclopentadiene	17 (40-140)	27 (40-140)	UJ (all non-detects)
D11_0.2-2MS/MSD (D11_0.2-2)	Phenol	-	92 (26-90)	None

No data were qualified due to high %R when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤50)	Validation Action
D11_0.2-2MS/MSD (D11_0.2-2)	2,4-Dinitrophenol 4,6-Dinitro-o-cresol	61 58	None

No data were qualified due to high RPDs when the associated results were non-detected.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (30-150)	MSD %R (30-150)	Validation Action
D11_0.2-2MS/MSD (D11_0.2-2)	delta-BHC	704	698	None
D11_0.2-2MS/MSD (D11_0.2-2)	Heptachlor epoxide	180	185	J (all detects)
	Dieldrin	180	190	J (all detects)
	cis-Chlordane	134	132	J (all detects)

No data were qualified due to high %Rs when the associated results were non-detected.

For D11_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

PCB, Herbicide

All criteria were met.

LCS Results

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1937841-LCS/LCSD (D11_0.2-2)	Phenol	-	95 (26-90)	None

No data were qualified due to high %R when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

VOC, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the SVOC and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, PCB and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
D11 0.2-2	cis-Chlordane	94	J (all detects)
D7 0-0.2	cis-Chlordane	148	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FQ
2nd Reviewer:

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	% RSD ≤ 20, r² ICV ≥ 30
IV	Continuing Calibration	SW	CCV ≥ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	FB= FB_06172024
VII	Surrogate Spikes	A	= TB_06172024
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2	L2434058-02		Soil	06/17/2024	Category B
2	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
3	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B

Notes:

WG1937663-5		

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20 and relative response factors (RRF) ≥ 0.05?	✓	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	2/20/24	ICAL - VOA126	HHHH		0.00163 (≥0.005)	All	J/UJ/A ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: F2

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	2/21/24	ICV-VOA126	JJ	35.5	all	J/UJ/A ND
	0718		G	33.9	↓	↓

	DOD	NFG
%D	20%	30%

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/21/24	CCV-VOA126	C	22.9		All	J/UJ/A ND
	0704		F	21.4		↓	↓
			HHH		0.001F (≥ 0.005)	↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943 R

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/21/24 **Associated samples:** All
Conc. units: ug/kg

Compound	Blank ID	Sample Identification							
	MB1			1					
1	23.9 [8.63]			-					
2	4.12 (14.72)			3.73 (14.71)					
	1= Boric acid, trimethyl ester								
	2= Cyclotrisiloxane, hexamethyl								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FD

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2+3	Several %R outside limit						#1	
	see following pages			(1-4 pages)				
						all %R =	J/UJ/A	all ND
						except ↓		
						%R for	HH = J/R/A	ND

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2434058
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: D11_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2434058-02	Analysis Date	: 06/21/24 11:39
Matrix Spike	: WG1937663-6	MS Analysis Date	: 06/22/24 21:37
Matrix Spike Dup	: WG1937663-7	MSD Analysis Date	: 06/22/24 22:16

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
Methylene chloride E	ND	136	83	61 Q	149	90	61 Q	8	70-130	30
1,1-Dichloroethane I	ND	136	93	68 Q	149	99	66 Q	7	70-130	30
Chloroform K	ND	136	80	59 Q	149	85	57 Q	6	70-130	30
Carbon tetrachloride O	ND	136	77	57 Q	149	76	51 Q	2	70-130	30
1,2-Dichloropropane Q	ND	136	78	58 Q	149	83	56 Q	6	70-130	30
Dibromochloromethane T	ND	136	63	46 Q	149	69	46 Q	9	70-130	30
1,1,2-Trichloroethane U	ND	136	71	52 Q	149	75	50 Q	6	70-130	30
Tetrachloroethene AΔ	ND	136	35	25 Q	149	35	24 Q	2	70-130	30
Chlorobenzene DD	ND	136	37	27 Q	149	41	27 Q	10	70-130	30
Trichlorofluoromethane KK	ND	136	130	98	149	140	97	8	70-139	30
1,2-Dichloroethane L	ND	136	80	59 Q	149	86	58 Q	6	70-130	30
1,1,1-Trichloroethane N	ND	136	85	62 Q	149	87	58 Q	3	70-130	30
Bromodichloromethane P	ND	136	72	53 Q	149	77	52 Q	8	70-130	30
trans-1,3-Dichloropropene W	ND	136	36	26 Q	149	40	27 Q	12	70-130	30
cis-1,3-Dichloropropene R	ND	136	28	20 Q	149	32	21 Q	14	70-130	30
1,1-Dichloropropene QQ	ND	136	60	44 Q	149	59	39 Q	2	70-130	30
Bromoform X	ND	136	55	41 Q	149	59	40 Q	6	70-130	30
1,1,2,2-Tetrachloroethane BB	ND	136	65	48 Q	149	67	45 Q	3	70-130	30
Benzene V	ND	136	71	52 Q	149	74	50 Q	4	70-130	30
Toluene CC	ND	136	46	34 Q	149	49	33 Q	5	70-130	30
Ethylbenzene EE	ND	136	33	24 Q	149	36	24 Q	9	70-130	30
Chloromethane Δ	ND	136	110	84	149	130	87	12	52-130	30

1/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2434058
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: D11_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2434058-02	Analysis Date	: 06/21/24 11:39
Matrix Spike	: WG1937663-6	MS Analysis Date	: 06/22/24 21:37
Matrix Spike Dup	: WG1937663-7	MSD Analysis Date	: 06/22/24 22:16

		Matrix Spike Sample				Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
Bromomethane B	ND	136	53	39 Q	149	60	40 Q	14	57-147	30
Vinyl chloride C	ND	136	150	108	149	160	108	9	67-130	30
Chloroethane D	ND	136	120	85	149	130	85	8	50-151	30
1,1-Dichloroethene I	ND	136	96	70	149	100	68	6	65-135	30
trans-1,2-Dichloroethene PPP	ND	136	68	50 Q	149	71	48 Q	5	70-130	30
Trichloroethene S	ND	136	50	37 Q	149	52	35 Q	3	70-130	30
1,2-Dichlorobenzene JJJ	ND	136	25	18 Q	149	27	18 Q	8	70-130	30
1,3-Dichlorobenzene FFF	ND	136	23	17 Q	149	25	17 Q	10	70-130	30
1,4-Dichlorobenzene HHH	ND	136	22	16 Q	149	25	17 Q	10	70-130	30
Methyl tert butyl ether LLL	ND	136	95	70	149	100	68	8	66-130	30
p/m-Xylene RRR	ND	272	63	23 Q	298	70	23 Q	11	70-130	30
o-Xylene SSS	ND	272	69	25 Q	298	77	26 Q	11	70-130	30
cis-1,2-Dichloroethene QQQ	ND	136	71	52 Q	149	76	51 Q	7	70-130	30
Dibromomethane RR	ND	136	81	59 Q	149	83	56 Q	4	70-130	30
Styrene ~~SS~~ FF	ND	272	47	17 Q	298	54	18 Q	14	70-130	30
Dichlorodifluoromethane JJ	ND	136	140	102	149	150	103	10	30-146	30
Acetone F	ND	136	120	90	149	120	83	1	54-140	30
Carbon disulfide G	ND	136	59	43 Q	149	61	41 Q	4	59-130	30
2-Butanone M	ND	136	74	54 Q	149	74	50 Q	0	70-130	30
Vinyl acetate HH	ND	136	ND	0 Q	149	ND	0 Q	NC	70-130	30
4-Methyl-2-pentanone Y	ND	136	26	19 Q	149	25	17 Q	3	70-130	30
1,2,3-Trichloropropane XX	ND	136	69	51 Q	149	71	47 Q	2	68-130	30

2/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2434058
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: D11_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2434058-02	Analysis Date	: 06/21/24 11:39
Matrix Spike	: WG1937663-6	MS Analysis Date	: 06/22/24 21:37
Matrix Spike Dup	: WG1937663-7	MSD Analysis Date	: 06/22/24 22:16

Parameter	Sample Conc. (ug/kg)	Matrix Spike Sample Spike Added (ug/kg)	Matrix Spike Sample Spike Conc. (ug/kg)	%R	Q	Matrix Spike Duplicate Spike Added (ug/kg)	Matrix Spike Duplicate Spike Conc. (ug/kg)	%R	Q	RPD	Recovery Limits	RPD Limit
2-Hexanone Z	ND	136	5.4J	4	Q	149	4.6J	3	Q	17	70-130	30
Bromochloromethane PP	ND	136	83	61	Q	149	88	59	Q	7	70-130	30
2,2-Dichloropropane OO	ND	136	88	65	Q	149	92	62	Q	5	70-130	30
1,2-Dibromoethane TT	ND	136	59	44	Q	149	64	43	Q	7	70-130	30
1,3-Dichloropropane SS	ND	136	68	50	Q	149	73	49	Q	8	69-130	30
1,1,1,2-Tetrachloroethane UU	ND	136	52	38	Q	149	58	39	Q	10	70-130	30
Bromobenzene WW	ND	136	33	24	Q	149	36	24	Q	8	70-130	30
n-Butylbenzene II	ND	136	13	10	Q	149	15	10	Q	16	70-130	30
sec-Butylbenzene EEE	ND	136	18	13	Q	149	21	14	Q	12	70-130	30
tert-Butylbenzene CCC	ND	136	22	16	Q	149	25	17	Q	12	70-130	30
o-Chlorotoluene ✓	ND	136	26	19	Q	149	28	19	Q	10	70-130	30
p-Chlorotoluene ✓	ND	136	23	17	Q	149	26	17	Q	12	70-130	30
1,2-Dibromo-3-chloropropane MM	ND	136	60	44	Q	149	59	40	Q	1	68-130	30
Hexachlorobutadiene LLL	ND	136	10	7	Q	149	13	9	Q	23	67-130	30
Isopropylbenzene VV	ND	136	27	20	Q	149	29	20	Q	7	70-130	30
p-Isopropyltoluene GGG	ND	136	17	12	Q	149	19	13	Q	14	70-130	30
Naphthalene MMM	ND	136	21	15	Q	149	22	15	Q	6	70-130	30
Acrylonitrile GGGG	ND	136	26	19	Q	149	32	21	Q	21	70-130	30
n-Propylbenzene YY	ND	136	21	16	Q	149	24	16	Q	12	70-130	30
1,2,3-Trichlorobenzene NNN	ND	136	16	12	Q	149	18	12	Q	11	70-130	30
1,2,4-Trichlorobenzene KKK	ND	136	15	11	Q	149	17	11	Q	11	70-130	30
1,3,5-Trimethylbenzene AAA	ND	136	23	17	Q	149	27	18	Q	13	70-130	30

3|4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	**Lab Number**	: L2434058
Project Name	: ELMWOOD PRESERVE	**Project Number**	: 3858.0004Y000
Client Sample ID	: D11_0.2-2	**Matrix (Level)**	: SOIL (LOW)
Lab Sample ID	: L2434058-02	**Analysis Date**	: 06/21/24 11:39
Matrix Spike	: WG1937663-6	**MS Analysis Date**	: 06/22/24 21:37
Matrix Spike Dup	: WG1937663-7	**MSD Analysis Date**	: 06/22/24 22:16

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
1,2,4-Trimethylbenzene DDP	ND	136	23	17 Q	149	26	18 Q	13	70-130	30
1,4-Dioxane	ND	6800	7300	108	7450	6900	92	6	65-136	30
p-Diethylbenzene ✓	ND	136	15	11 Q	149	18	12 Q	17	70-130	30
p-Ethyltoluene ✓	ND	136	21	15 Q	149	24	16 Q	13	70-130	30
1,2,4,5-Tetramethylbenzene A2	ND	136	17	13 Q	149	20	13 Q	14	70-130	30
Ethyl ether	ND	136	96	70	149	100	68	7	67-130	30
trans-1,4-Dichloro-2-butene YYYY	ND	136	8.2	6 Q	149	10	7 Q	23	70-130	30

4/4

LDC #:60943R

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	2/20/2024	C	0.317	0.317	0.306	0.306	6.20	6.20
	VOA126		CC	0.854	0.854	0.850	0.850	4.67	4.67
			BB	0.600	0.600	0.555	0.555	5.97	5.97

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA 126	6/21/24 0704	C	0.306	0.376	0.376	22.9	22.9
			CC	0.850	0.842	0.842	0.9	0.9
			BB	0.555	0.503	0.503	9.4	9.4

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 R

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample:

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	21.472	107	107	0
1,2-Dichloroethane-d4	↓	21.157	106	106	↓
Toluene-d8		19.885	99	99	
4-Bromofluorobenzene		19.429	97	97	

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 1 + 3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	136	149	ND	96	100	70	71	68	67	6	4.08
Trichloroethene	↓	↓	ND	50	52	37	37	35	35	3	3.92
Benzene			↓	71	74	52	52	50	50	4	4.14
Toluene				46	49	34	34	33	33	5	6.32
Chlorobenzene				37	41	27	37	27	27	10	10.26

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937663-3/4

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	41.455	39.374	104	104	98	98	6	5.15
Trichloroethene			40.835	40.327	102	102	101	101	1	1.25
Benzene			42.778	41.789	107	107	104	104	3	2.34
Toluene			39.631	38.280	99	99	96	96	3	3.47
Chlorobenzene			38.955	38.113	97	97	95	95	2	2.19

LDC #: 60943 R

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG1937663 - LCS ✓

Concentration = $\frac{(157912)(20.0)}{(754230)(0.977)}$

= 42.77 ug/kg

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	V	42.77	42.778	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: [signature]
2nd Reviewer:

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20 (2nd ICV ≤ 30)
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_06172024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = Jdet
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2	L2434058-02		Soil	06/17/2024	Category B
2	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
3	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B

Notes:

37

WG1937841-1		

LDC #: 60943R

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/23/24 0922	CCV - Mindy	MMM	31.5		All	J/UJ/A ND
			G	24.5			
			HH	21.3		↓	↓
			II	24.9			

DOD
%D 20%/50%

NFG
20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	X	17	27	40-140			#1	J/UJ/A and ND
	HH				61	50		J dd/A
	4,6-Dinitro-O-cresol				58	50		↓
	Δ		92	~~29~~ 26-90				J dd/A

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1937841-1 LCS/LCSD	A		95	26-90			All	J (all p) ND

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL Mindy	2/20/2024	A	1.595	1.595	1.617	1.617	2.30	2.30
			S	1.069	1.069	1.086	1.086	4.97	4.97
			GG	1.119	1.119	1.113	1.113	4.14	4.14
			UU	1.082	1.082	1.098	1.098	5.86	5.86
			DDD	1.306	1.306	1.291	1.291	6.97	6.97
			JJJ	1.166	1.166	1.176	1.176	4.70	4.70

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV Mindy	6/23/24 0922	A	1.617	1.564	1.566	3.2	3.2
			S	1.086	0.968	0.968	10.9	10.9
			GG	1.113	1.051	1.051	5.6	5.6
			HH	1.098	0.989	0.989	9.9	9.9
			DDD	1.291	1.248	1.248	3.3	3.3
			JJJ	1.176	1.151	1.151	2.1	2.1

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL) 20.742	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	~~39.518~~	83	83	0
2-Fluorobiphenyl	↓	17.333	69	69	↓
Terphenyl-d14	↓	17.776	71	71	↓
Phenol-d5	50.0	39.518	79	79	↓
2-Fluorophenol	↓	40.896	82	82	↓
2,4,6-Tribromophenol	↓	46.182	92	92	↓

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA
RPD = | MS - MSD | * 2/(MS + MSD)

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration, MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

Sample: 2 & 3

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1620	1640	ND	1300	1500	80	80	92	91	14	14.3
N-Nitroso-di-n-propylamine				1400	1600	86	86	98	98	13	13.3
4-Chloro-3-methylphenol				280	510	17	17	31	31	58	58.2
Acenaphthene			ND	~~80~~ 1300	1400	80	80	86	85	7	7.4
Pentachlorophenol				1400	1500	86	86	92	92	7	6.9
Pyrene			38	1300	1500	80	80	92	92	14	14.3

LDC # 60943R

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG193784 1 - LCS 1P

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	31.893	38.167	80	80	95	95	17	17.9
N-Nitroso-di-n-propylamine			32.271	38.418	80	80	96	96	18	17.6
4-Chloro-3-methylphenol			34.521	40.238	86	86	100	100	15	15.3
Acenaphthene			29.240	34.106	73	73	85	85	15	15.4
Pentachlorophenol			25.912	32.743	65	65	82	82	23	23.3
Pyrene			30.666	36.750	77	77	92	92	18	18.1

LDC #: 60943R

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

#1 DDD

Concentration = $\frac{(6658)(40)(1)(1000)}{(290982)(1.291)(30.52)(0.80)}$

= 29.04 ug/kg

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	DDD	29.04	29	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r^2 ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB_06172024 from same SDG
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL<samples<RL, J det/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2	L2434058-02		Soil	06/17/2024	Category B
2	D7_0-0.2	L2434058-17		Soil	06/17/2024	Category B
3	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
4	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B

Notes:

1 WG1937822-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/24/24	WG1938341-1	1	Endrin Aldehyde	24.5	ALL, MB1 (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.
Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	Delta-BHC	704	698	30-150			1 (ND)	JDET/A
	Heptachlor epoxide	180	185	30-150			1 (DET)	
	Dieldrin	180	190	30-150				
	cis-Chlordane	134	132	30-150				
						%R out, no qual, sample result > 4x spike (text)		

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1 (DET)	cis-Chlordane	94	JDET/A
				↓
	2 (DET)	cis-Chlordane	148	↓

Comments:_____

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDE (CLP1)	1.316	1.316	1.381	1.381	16.23	16.23
			4,4'-DDE (CLP2)	1.232	1.232	1.211	1.211	5.86	5.86

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938341-1 PEST15	06/24/24	Dieldrin (CLP1)	1.322	1.221	1.221	7.6	7.6
			Dieldrin (CLP2)	1.156	1.290	1.290	11.6	11.6
			4,4'-DDE (CLP1)	1.381	1.159	1.159	16.1	16.1
			4,4'-DDE (CLP2)	1.211	1.252	1.251	3.4	3.3

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	35.191	70	70	0
Tetrachloro-m- xylene	RTX-CLP2	50	41.112	82	82	0
Decachlorobiphenyl	RTX-CLP1	50	31.909	64	64	0
Decachlorobiphenyl	RTX-CLP2	50	41.176	82	82	0

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	40.6	41.1	125.00	198.0	203.0	180	180	190	190	2	2
4,4'-DDD	40.6	41.1	0.0	43.0	43.8	106	106	107	107	2	2

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937822-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	31.50	32.70	28.90	29.30	92	92	90	90	2	3
4,4'-DDD	31.50	32.70	28.30	28.70	90	90	88	88	2	3

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	1.912E+09	1.778E+08	25	1.211	10.00	15.30	1.00	80	**181**	**181**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-060172024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	ND results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2	L2434058-02		Soil	06/17/2024	Category B
2	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
3	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B

Notes:

1 WG1937835-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943R

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest 23	8/25/2023	1260-1 (CLP1)	0.067	0.067	0.062	0.062	15.68	15.72
			1260-1 (CLP2)	0.057	0.057	0.053	0.053	12.18	12.22

LDC#: 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938116-1	06/23/24	1260-1 (CLP1)	0.062	0.049	0.049	21	21
			1260-1 (CLP2)	0.053	0.045	0.045	15.1	15.1

LDC # _60943R

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	296.914	59	59	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	319.004	64	64	0
Decachlorobiphenyl	RTX-CLP1	500.00	324.488	65	65	0
Decachlorobiphenyl	RTX-CLP2	500.00	342.684	69	69	0

LDC # _60943R

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	378	378	0	234	226	62	62	61	60	3	3

LDC # _60943R

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937835-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	293	293	235	230	80	80	78	78	3	3

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	4.929E+08	925400000	250	0.062	5.00	10.67	1.00	N/A	**2142.783**	2137.385	0
	1260-Total =	(2137.385+2489.946+2427.788+2847.395+2623.574)						conc =	(2505.22)(5mL)		**final conc**	
			5						(10.67 g) (5mL)		**(ug/Kg)**	
	=	2505.22						=	**235**		235	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06172024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results<RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2	L2434058-02		Soil	06/17/2024	Category B
2	D7_0-0.2	L2434058-17		Soil	06/17/2024	Category B
3	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
4	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B

Notes:

WG1937865-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Herbicides (EPA SW-846 Method 8151A)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/23/24	WG1938121-2	1	2,4,5-T	26.8	2, MB1 (ND)	J/UJ/A
			2	2,4-D	21.5		

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938121-1	06/23/24	2,4-D (CLP1)	0.240	0.268	0.268	11.6	11.7
			2,4-D (CLP2)	0.237	0.269	0.269	13.5	13.3

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938121-2	06/23/24	2,4-D (CLP1)	0.240	0.253	0.253	5.4	5.4
			2,4-D (CLP2)	0.237	0.288	0.289	21.5	21.3

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.503	101	101	0
DCAA	RTX-CLP2	0.500	0.483	97	97	0

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	202	203	0	201	190	100	100	94	94	6	6

LDC# 60943R

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937865-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	162	133	144	82	82	89	89	8	8

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	3.787E+08	9.623E+08	0.250	0.240	1.00	30.75	1.00	NA	**133**	**133**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434058
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
D11_0.2-2	L2434058-02	Metals, Wet Chemistry
D7_0-0.2	L2434058-17	Metals, Wet Chemistry
D11_0.2-2MS	L2434058-02MS	Metals, Wet Chemistry
D11_0.2-2MSD	L2434058-02MSD	Metals, Wet Chemistry
D11_0.2-2DUP	L2434058-02DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06172024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 17, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	1.13 mg/Kg	5.650 mg/Kg	D11_0.2-2 D7_0-0.2
ICB/CCB	Antimony	0.00611 mg/L	1.222 mg/Kg	D11_0.2-2 D7_0-0.2
ICB/CCB	Iron	0.013 mg/L	2.6 mg/Kg	D11_0.2-2
ICB/CCB	Iron	0.0121 mg/L	2.42 mg/Kg	D7_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
D11_0.2-2	Antimony	1.37 mg/Kg	4.81U mg/Kg
D7_0-0.2	Antimony	0.627 mg/Kg	4.93U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

Contamination was detected in the field blank sample FB_06172024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06172024	Barium	0.00090 mg/L	0.0045 mg/Kg	D11_0.2-2 D7_0-0.2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06172024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
D11_0.2-2MS/MSD (D11_0.2-2 D7_0-0.2)	Antimony	-	70 (75-125)	J (all detects)
	Chromium	-	21 (75-125)	J (all detects)
	Lead	-	42 (75-125)	J (all detects)
	Magnesium	-	73 (75-125)	J (all detects)
	Zinc	-	67 (75-125)	J (all detects)
	Mercury	77 (80-120)	-	J (all detects)

For D11_0.2-2MS/MSD, although the MS percent recovery was severely low for chromium, the associated sample results were qualified as estimated (J) since the post spike (PS) recovery was within the QC limits for this analyte.

For D11_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) and relative percent differences (RPD) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
D11_0.2-2 D7_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB=FB_06172424
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2 2x, all except Hg (matrix)	L2434058-02		Soil	06/17/2024	Category B
2	D7_0-0.2	L2434058-17		Soil	06/17/2024	Category B
3	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
4	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1	2			
Fe	1.13		5.650					
Sb		0.00611	1.222	1.37/4.81U	0.627/4.93U			

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe		0.013	2.6					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 2

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe		0.0121	2.42					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/17/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06172024							
Ba	0.00090	0.0045						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943R_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	PS %R	PS Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	Sb		70	75-125		75-125			All	J/UJ/A	Det
		Cr		21	75-125	79	75-125			All	J/UJ/A*	Det
		Pb		42	75-125		75-125			All	J/UJ/A	Det
		Mg		73	75-125		75-125			All	J/UJ/A	Det
		Zn		67	75-125		75-125			All	J/UJ/A	Det
		Hg	77		80-120					All	J/UJ/A	Det

Comments: **3-4: multiple anlaytes >4x, %R, RPD**
***/R changed to /UJ due to passing PS**

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Pb	0.496	0.500	99.2	99	Y
CCV	ICP	As	0.473	0.500	94.6	95	Y
LLCC	ICP						
ICSAB	ICP	Ca	485	500	97	97	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	96	Y
CCV	CVAA	Hg	0.0101	0.0100	101	101	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1937289 LCS	LCS	Ag	4.27	4.0	106.75	107	Y
3	MS	Cu	25.4	23.9	106.2761506	106	Y
4	Duplicate	Fe	23400	25300	7.802874743	8	Y
1 PDS	PDS	Zn	39.1	48.1	81.28898129	81	Y
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Pb	1.3472	2	1.294	50	80	130	130.1391036	Y
2	K	15.9617	2	1.264	50	80	1570	1578.490902	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943R
SDG #: L2434058
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NP
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_06172024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<nosamplesRL, no dil'n.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11_0.2-2	L2434058-02		Soil	06/17/2024	Category B
2	D7_0-0.2	L2434058-17		Soil	06/17/2024	Category B
3	D11_0.2-2MS	L2434058-02MS	MS	Soil	06/17/2024	Category B
4	D11_0.2-2MSD	L2434058-02MSD	MSD	Soil	06/17/2024	Category B
5	D11_0.2-2DUP	L2434058-02DUP	DUP	Soil	06/17/2024	Category B

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)
QC	
3-4	CN-
3-5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10781	0.1		107.81	108	Y
Calibration verification	Cr(VI)	0.208	0.200		104	104	Y
Calibration verification	Cr(VI)	0.208	0.200		104	104	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1937522 LCS	LCS		197	192	102.6041667	103	Y
3	MS	CN-	11	12	91.66666667	93	Y
4	Duplicate	CN-	100	93	7.25388601	7	Y

* Lab used %R's to calculate RPD

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	0.16372	1	1.0479	50	80	1.2 U	0.195295353	Y
2	Cr(VI)	0.000	1	2.5706	100	80	0.996 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434335
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E3_0.2-2	L2434335-02	VOC, SVOC, Pesticide, PCB, Herbicide
E7_0-0.2	L2434335-13	Pesticide, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06182024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 18, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/06/24	ICAL-VOA127	1,4-Dioxane	0.00240 (≥0.005)	E3_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/07/24	ICV-VOA127	Carbon disulfide	36.2	E3_0.2-2	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/22/24	CCV-VOA127	Dichlorodifluoromethane	22	E3_0.2-2	UJ (all non-detects)
		Chloromethane	45.8		UJ (all non-detects)
		Bromomethane	24.3		UJ (all non-detects)
		Vinyl acetate	20.7		UJ (all non-detects)
		4-Methyl-2-pentanone	20.7		UJ (all non-detects)
		2-Hexanone	23.6		UJ (all non-detects)
		Bromoform	29		UJ (all non-detects)
		1,1,2,2-Tetrachloroethane	25.5		UJ (all non-detects)
		1,2,3-Trichloropropane	24.8		UJ (all non-detects)
		trans-1,4-Dichloro-2-butene	26.5		UJ (all non-detects)
		Naphthalene	26.2		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/22/24	CCV-VOA127	1,4-Dioxane	0.002 (≥0.005)	E3_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/24/24 (1128)	CCV-SV124	Hexachlorobutadiene	31.5	E3_0.2-2	UJ (all non-detects)
		Hexachlorocyclopentadiene	46.9		UJ (all non-detects)
		2,4,6-Trichlorophenol	27.2		UJ (all non-detects)
		2,4,5-Trichlorophenol	26.3		UJ (all non-detects)
		2,4-Dinitrophenol	23.5		UJ (all non-detects)
		4,6-Dinitro-o-cresol	26.4		UJ (all non-detects)
		4-Bromophenyl-phenyl ether	20.8		UJ (all non-detects)
		Pentachlorophenol	22.9		UJ (all non-detects)
06/24/24 (1146)	CCV-SV124	1,2,4,5-Tetrachlorobenzene	27.3	E3_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/25/24	WG1939065-1	1	Endrin aldehyde	23.5	E3_0.2-2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1938591	Toluene	0.74 ug/Kg	RL	E3_0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the trip blank sample TB_06182024 for VOC analysis.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1938591-LCS/LCSD (E3_0.2-2)	Chloromethane	145 (52-130)	138 (52-130)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1938072-LCS/LCSD (E3_0.2-2)	4-Chloroaniline	39 (40-140)	-	UJ (all non-detects)
	1,4-Dioxane	36 (40-140)	36 (40-140)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the SVOC, pesticide, and PCB analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
E3_0.2-2	cis-Chlordane	123	J (all detects)
	Chlordane	86	J (all detects)
E7_0-0.2	cis-Chlordane	117	J (all detects)
	Toxaphene	80	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EJ
2nd Reviewer: EJ

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB_06182024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	
IX	Laboratory Control Sample	SW	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NJ Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2	L2434335-02		Soil	06/18/2024	Category B

Notes:

WG1938591 - 5 Blank		

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ~~≤ 30%~~/15% and relative response factors (RRF) ≥ 0.05? 30 U	~~✓~~	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943S

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	6/6/24	ICAL-VOA127	HHHH		0.00240 (≥0.005)	All	J/UJ/A ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 609435

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: D

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0% (30%))	Associated samples	Qualifications
	6/7/24 0211	ICV-VOA 127	G	36.2	All	J/UJ/A NP

	DOD	NFG
%D	20%	30%

LDC #: 60943 S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/22/24 0752	CCV-VOA127	JJ	22		All	J/UJ/A (ND)
			A	45.8			
			B	24.3			
			HH	20.7			
			Y	20.7			
			Z	23.6			
			X	29			
			BB	25.5			
			XX	24.8			
			YYYY	26.5			
			MMM	26.2			
			HHHH		0.002 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943S

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/22/24 **Associated samples:** All (ND)
Conc. units: ng/kg

Compound	Blank ID	Sample Identification							
	MB1								
cc	0.74								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943S

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: F7

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1938591-Las ID	A	145	138	52-130			All	J(+) / P ND

LDC #:60943S

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	6/6//24	V	1.006	1.006	1.007	1.007	5.84	5.84
	VOA127		CC	0.829	0.829	0.832	0.832	6.71	6.71
			BB	0.810	0.810	0.769	0.769	6.53	6.53

LDC # 60943s

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA127	6/22/24 0752	Y	1.007	1.06	1.06	5.3	5.3
			CC	0.832	0.898	0.898	7.9	7.9
			BB	0.769	0.573	0.573	25.5	25.5

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 609435

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.746	99	99	0
1,2-Dichloroethane-d4		20.905	105	105	
Toluene-d8		20.939	105	105	
4-Bromofluorobenzene		21.589	108	108	

LDC # 60943S

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG193859/1-LCS ND

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	37.609	36.581	95	95	93	93	2	1.8
Trichloroethene	↓	↓	39.857	39.012	100	100	98	98	2	2.1
Benzene			42.078	40.803	105	105	102	102	3	3.1
Toluene			43.186	41.509	108	108	104	104	4	4.0
Chlorobenzene			40.908	39.688	102	102	99	99	3	3.0

LDC #: 60943S

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG1938591 - LCS

Concentration = $\frac{(420857)(20)}{(198558)(1.007)}$

= 42.1

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	Y	42.1	~~37.609~~, FT 42.078	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FT
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

+TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Result < RL > MDL = J/U/A
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2	L2434335-02		Soil	06/18/2024	Category B

Notes:

WG1938072-1		

LDC #: 609435

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	06/24/24 1128	CCV - SV124	U	31.5		All	J/UJ/A ND
			X	46.9			
			Y	27.2			
			Z	26.3			
			HH	23.5			
		4,6-Dinitro-o-cresol		26.4			
			RR	20.8			
			TT	22.9			
			~~YYYY~~				
	06/24/24 1146	CCV - SV124	YYYY	27.3		↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 60943 S

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG193807 2-	T	39		40-140			All	J/UJ/P ND
lcs ID	III I	36	36	40-140			↓	↓

LDC # 60943S

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV124	6/4/2024	A	1.407	1.407	1.407	1.407	9.80	9.80
			S	0.969	0.969	0.980	0.980	2.17	2.17
			GG	1.023	1.023	1.013	1.013	2.36	2.36
			UU	0.973	0.973	0.978	0.978	1.82	1.82
			DDD	1.191	1.191	1.188	1.188	3.27	3.27
			JJJ	1.236	1.236	1.264	1.264	6.75	6.75

LDC # 60943 S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV 5/1/24	6/24/24 1128	A	1.407	1.375	1.375	2.3	2.3
			S	0.980	0.99	0.99	1	1
			GG	1.013	1.025	1.025	1.2	1.2
			HH	0.978	1.002	1.002	2.5	2.5
			DDD	1.188	1.23	1.23	3.5	3.5
			JJJ	1.264	1.313	1.313	3.9	3.9

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 S

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ng/ml)	Surrogate Found (ng/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	11.496	46	46	0
2-Fluorobiphenyl	↓	13.297	53	53	
Terphenyl-d14	↓	11.964	48	48	↓
Phenol-d5	50.0	25.979	52	52	
2-Fluorophenol	↓	26.948	54	54	
2,4,6-Tribromophenol	↓	33.30	67	67	↓

LDC # 60943S

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1938072-2/3

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40	22.702	24.477	57	57	61	61	7	7.5
N-Nitroso-di-n-propylamine			21.266	23.225	53	53	58	58	9	8.8
4-Chloro-3-methylphenol			23.094	26.149	58	58	65	65	11	12.4
Acenaphthene			22.317	22.801	56	56	57	57	2	2.1
Pentachlorophenol			22.226	26.916	56	56	57	57	18	19.1
Pyrene			23.025	25.316	58	58	63	63	8	9.5

LDC #: 60943S

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer FT

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

#1 UU

Concentration = $\frac{(15295)(40.0)(1)(1000)}{(960984)(0.978)(30.3)(0.88}$

= 24.41 ug/kg

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	UU	24.41	24	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MQ
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL< samples <RL, Jdet/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2	L2434335-02		Soil	06/18/2024	Category B
2	E7_0-0.2	L2434335-13		Soil	06/18/2024	Category B

Notes:

1 WG1938236-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/25/24	WG1939065-1	1	Endrin Aldehyde	23.5	1 (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1 (DET)	cis-Chlordane	123	JDET/A
		Chlordane	86	
	2 (DET)	cis-Chlordane	117	
		Toxaphene	80	

Comments:

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1939065-1	06/25/24	Dieldrin (CLP1)	1.268	1.275	1.275	0.6	0.6
			Dieldrin (CLP2)	1.203	1.226	1.226	1.9	1.9
			4,4'-DDT (CLP1)	1.112	1.046	1.047	5.9	5.9
			4,4'-DDT (CLP2)	1.087	1.047	1.047	3.7	3.7

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1939065-4	06/25/24	Dieldrin (CLP1)	1.268	1.463	1.463	15.4	15.4
			Dieldrin (CLP2)	1.203	1.395	1.395	16.0	16.0
			4,4'-DDT (CLP1)	1.112	0.932	0.932	16.3	16.2
			4,4'-DDT (CLP2)	1.087	0.894	0.894	17.8	17.8

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	33.390	67	67	0
Tetrachloro-m- xylene	RTX-CLP2	50	36.641	73	73	0
Decachlorobiphenyl	RTX-CLP1	50	38.834	78	78	0
Decachlorobiphenyl	RTX-CLP2	50	47.589	95	95	0

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1938236-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.30	31.70	33.30	29.70	103	103	94	94	9	9
4,4'-DDD	32.30	31.70	33.80	30.10	105	105	95	95	10	10

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	Dieldrin	4.967E+08	4.427E+07	25	1.268	10.00	15.78	1.00	83	**169**	**170**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<samples<RL, J(det)/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2	L2434335-02		Soil	06/18/2024	Category B

Notes:

1 WG1938250-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943S

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST2	2/5/2024	1260-1 (CLP1)	0.078	0.078	0.074	0.074	17.16	17.45
			1260-1 (CLP2)	0.073	0.073	0.071	0.071	13.25	13.12

LDC#: 60943S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938367-1	06/24/24	1260-1 (CLP1)	0.074	0.071	0.071	4.1	4.1
			1260-1 (CLP2)	0.071	0.071	0.071	0.0	0.0

LDC # _60943S

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	466.890	93	93	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	491.356	98	98	0
Decachlorobiphenyl	RTX-CLP1	500.00	541.757	108	108	0
Decachlorobiphenyl	RTX-CLP2	500.00	599.714	120	120	0

LDC # _60943S

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1938250-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	303	298	260	252	86	86	85	85	1	1

LDC # _60943S

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
1	1254-3	2.243E+07	459800000	250	0.089	5.00	10.87	1.00	N/A	**137.016**	140.560	0
	1254-Total =	(140.560+103.666+448.824)						conc =	(231)(5mL)		**final conc**	
		3							(10.87 g) (5mL)(0.88)		**(ug/Kg)**	
	=	231.02						=	**24.2**		24.2	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2	L2434335-02		Soil	06/18/2024	Category B
2	E7_0-0.2	L2434335-13		Soil	06/18/2024	Category B

Notes:

WG1937960-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: MN

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	5/21/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
	PEST16		2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938123-1	06/23/24	2,4-D (CLP1)	0.132	0.139	0.139	5.3	5.3
			2,4-D (CLP2)	0.217	0.250	0.250	15.2	15.2

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938123-2	06/23/24	2,4-D (CLP1)	0.132	0.136	0.133	3.0	3.0
			2,4-D (CLP2)	0.217	0.256	0.254	18.0	18.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.509	102	102	0
DCAA	RTX-CLP2	0.500	0.511	102	102	0

LDC# 60943S

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937960-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	162	166	143	102	102	88	88	15	14

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	3.020E+08	1.119E+09	0.250	0.132	1.00	30.67	1.00	NA	**166**	**166**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434335
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E3_0.2-2	L2434335-02	Metals, Wet Chemistry
E7_0-0.2	L2434335-13	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 18, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	1.4 mg/Kg	7.000 mg/Kg	E3_0.2-2 E7_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Wet Chemistry

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
WG1938326 LCS (E3_0.2-2 E7_0-0.2)	Hexavalent chromium	74 (80-120)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E3_0.2-2 E7_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL-samples - RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2 2x, all except Hg (matrix)	L2434335-02		Soil	06/18/2024	Category B
2	E7_0-0.2	L2434335-13		Soil	06/18/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level (mg/kg)**					
Fe	1.4		7.000					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Zn	0.501	0.500	100.2	100	Y
CCV	ICP	Al	0.468	0.500	93.6	94	Y
LLCC	ICP						
ICSAB	ICP	Fe	185	200	92.5	92	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	96	Y
CCV	CVAA	Hg	0.0101	0.0100	101	101	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG 1937678 LCS	LCS	Pb	40.9	42.4	96.46226415	96	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cd	0.0022	2	1.259	50	88	0.197	0.198570294	Y
2	Hg (ug/L)	2.752	1	0.377	50	83	0.442	0.439743057	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943S
SDG #: L2434335
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NE
2nd Reviewer: CL

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	SW	LCS|LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL <no samples <RL, no dilu.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_0.2-2	L2434335-02		Soil	06/18/2024	Category B
2	E7_0-0.2	L2434335-13		Soil	06/18/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?		NO		

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEETS
Laboratory Control Sample

METHOD: Inorganics
A LCS was analzyed for each matrix at the required frequencies. All LCS percent recoveries (%R) were within the acceptable limits with the following exceptions.

LCS ID	Matrix	Analyte	LCS %R	%R Limit	Associated Samples	Qualification	Det/ND
WG1938326 LCS	soil	Cr(VI)	74	80-120	All	J/UJ/P	ND

Comments:

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

Reviewer: NF

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.11004	0.1		110.04	110	Y
Calibration verification	Cr(VI)	0.200	0.200		100	100	Y
Calibration verification	Cr(VI)	0.200	0.200		100	100	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1937779 LCS	LCS	CN-	73	72.5	100.6896552		---
	MS						
WG1937779 LCSD	Duplicate	CN-	104	100	3.921568627	4	Y

***lab used %R for RPD calculation**

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	-0.18434	1	1.0155	50	88	1.1 U	-0.206279934	Y
2	Cr(VI)	0.000	1	2.491	100	83	0.968 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434640
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E12_0.2-2	L2434640-02	VOC, SVOC, Pesticide, PCB, Herbicide
F15_0-0.2	L2434640-13	Pesticide, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06192024, FB_06192024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 19, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/23/24	CCV-VOA100	Dichlorodifluoromethane	29.4	E12_0.2-2	UJ (all non-detects)
		Chloromethane	25.5		UJ (all non-detects)
		Vinyl chloride	37.1		UJ (all non-detects)
		Bromomethane	43.1		UJ (all non-detects)
		Chloroethane	34.1		UJ (all non-detects)
		Trichlorofluoromethane	22.3		UJ (all non-detects)
		1,1-Dichloroethene	27.1		UJ (all non-detects)
		Carbon disulfide	27.8		UJ (all non-detects)
		trans-1,2-Dichloroethene	20.3		UJ (all non-detects)
		1,1-Dichloroethane	21.5		UJ (all non-detects)
		2,2-Dichloropropane	24.3		UJ (all non-detects)
		1,1-Dichloropropene	29.5		UJ (all non-detects)
		Tetrachloroethene	25.4		UJ (all non-detects)
		Isopropylbenzene	21.2		UJ (all non-detects)
		p-Isopropyltoluene	20.5		UJ (all non-detects)
		Hexachlorobutadiene	28.6		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/26/24 (0143)	CCV-Mindy	Bis(2-chloroisopropyl) ether Hexachlorocyclopentadiene	28.9 34.2	E12_0.2-2	UJ (all non-detects) UJ (all non-detects)
06/26/24 (0207)	CCV-Mindy	Biphenyl	20.3	E12_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/26/24	WG1939755-1	1	beta-BHC Endrin aldehyde	22.6 20.1	E12_0.2-2 F15_0-0.2	UJ (all non-detects) UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG1938616-5	m,p-Xylene	0.61 ug/Kg	RL	E12_0.2-2
	o-Xylene	0.58 ug/Kg	RL	
	Xylenes, total	1.2 ug/Kg	RL	
	Styrene	0.76 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
E12_0.2-2	m,p-Xylene	0.60 ug/Kg	2.2U ug/Kg
	Xylenes, total	0.60 ug/Kg	1.1U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06192024 for VOC analysis.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the trip blank sample FB_06192024 for pesticide and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1938616-LCS/LCSD (E12_0.2-2)	Bromomethane	-	56 (57-147)	UJ (all non-detects)
	Vinyl chloride	63 (67-130)	63 (67-130)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1938806-LCS/LCSD (E12_0.2-2)	1,4-Dioxane	38 (40-140)	-	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
E12 0.2-2	cis-Chlordane	82	J (all detects)
F15 0-0.2	cis-Chlordane	91	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EZ
2nd Reviewer: CW

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	GC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	Δ/Δ	%RSD ≤ 20, r² ICV ≤ 30 CCV ≤ 20
IV	Continuing Calibration	SW	
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB_061920 24
VII	Surrogate Spikes	Δ	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS IP
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	Δ	Result < RL > MDL = Jdw
XIII	Target Analyte Identification	Δ	
XIV	Overall Assessment of Data	Δ	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2	L2434640-02		Soil	06/19/2024	Category B

Notes:

WG1938616 - 5 Blank		

LDC #: 60943T

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20 and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/23/24	CCV-VOA100	JJ	29.4		All	J/UJ/A NP
	1659		A	25.5			
			C	37.1			
			B	43.1			
			D	34.1			
			KK	22.3			
			H	27.1			
			G	27.8			
			PPP	20.3			
			I	21.5			
			OO	24.3			
			QQ	29.5			
			AA	25.4			
			VV	21.2			
			GGG	20.5			
			LLL	28.6		↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943T

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 4/23/24 **Associated samples:** All
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1		1						
RRR	0.61		0.60 / 2.24						
SSS	0.58		-						
GG	1.2		0.60 / 1.14						
FF	0.76								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943T

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: EJ

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG193861 6-LCS ID	B		52	57-147			All	J/UJ/P ND
	C	63	63	67-130			↓	↓

LDC #: 60943T

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL VOA100	4/10/2024	C	0.267	0.267	0.291	0.291	14.11	14.11
			CC	0.609	0.609	0.652	0.652	9.75	9.75
			MMM	1.560	1.560	1.579	1.579	7.56	7.56

LDC # 60943 T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV	6/23/24 1659	C	0.291	0.183	0.183	37.1	37.1
			CC	0.652	0.544	0.544	16.6	16.6
			MMM	1.579	1.708	1.708	8.2	8.2

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943T

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.972	105	105	0
1,2-Dichloroethane-d4		18.301	92	92	
Toluene-d8		19.583	98	98	
4-Bromofluorobenzene		19.500	98	98	

LDC # 60943T

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1938616 - lcs lcsd

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.0	40.0	29.159	29.013	73	73	72	72	1	0.50
Trichloroethene			34.608	34.923	86	86	87	87	1	0.91
Benzene			32.634	32.493	82	82	81	81	1	0.43
Toluene			33.37U	33.652	83	83	84	84	1	0.84
Chlorobenzene			35.60U	35.820	89	89	90	90	1	0.62

LDC #: 60943 T

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

#2

$$\text{Concentration} = \frac{\left(\frac{153}{248333} + 0.0140202\right)(20)(5)}{(0.52784)(5.5)(0.84)}$$

$$= 0.60 \text{ ug/kg}$$

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#2	RRR	0.60	0.60	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: Semivolatiles (EPA 8270E) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r ≥ 0.99 ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS HP
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NJ Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2	L2434640-02		Soil	06/19/2024	Category B

Notes:

WG1938806		

LDC #: 60943T

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/26/24 0143	ccv - Mindy	MMM	28.9		All - MB1	J/W/A ND
			X	34.2		↓	↓
	6/26/24 0207	ccv - Mindy	EEEE	20.3		↓	J/W/A ND
	6/25/24 1214	ccv - Mark	MMM	29.9		MB1	J/W/A ND
			EE	22		↓	↓
			MM	20.6			
			4,6-Dinitro-o-cresol	38.1			

	DOD	NFG		
%D	20%/50%	20%	RRF: 0.001 - poor performers	0.05 - all other analytes

LDC #: 60943 T

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1938806-LCS ID	IIII	38		40-140			all	J/UJ/P ND

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL Mindy	2/20/2024	A	1.595	1.595	1.617	1.617	2.30	2.30
			S	1.069	1.069	1.086	1.086	4.97	4.97
			GG	1.119	1.119	1.113	1.113	4.14	4.14
			UU	1.082	1.082	1.098	1.098	5.86	5.86
			DDD	1.306	1.306	1.291	1.291	6.97	6.97
			JJJ	1.166	1.166	1.176	1.176	4.70	4.70

LDC # 60943T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv Mindy	4/26/24 0143	Δ	1.617	1.597	1.597	1.2	1.2
			S	1.086	0.946	0.946	12.9	12.9
			GG	1.113	1.012	1.012	9.1	9.1
			UU	1.098	0.961	0.961	12.5	12.5
			DDD	1.291	1.227	1.227	5	5
			JJJ	1.176	1.102	1.102	6.3	6.3

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943 T

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 2

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	19.476	78	78	0
2-Fluorobiphenyl	↓	14.954	60	60	
Terphenyl-d14	↓	12.203	49	49	↓
Phenol-d5	50.0	39.212	78	78	
2-Fluorophenol		41.006	82	82	
2,4,6-Tribromophenol	↓	37.510	75	75	↓

LDC # 60943 T

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1938806-2 LCS IP

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	4U	4U	27.712	32.719	69	69	82	82	17	16.6
N-Nitroso-di-n-propylamine			26.190	28.887	65	65	72	72	10	9.8
4-Chloro-3-methylphenol			32.205	36.633	80	80	92	92	14	12.9
Acenaphthene			30.239	33.526	76	76	84	84	10	10.3
Pentachlorophenol			31.293	34.341	78	78	86	86	10	9.3
Pyrene			33.408	36.991	84	84	92	92	9	10.2

LDC #: 60943T

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

W G919 38806 - LCS A

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

$$\text{Concentration} = \frac{(94379)(40.0)(1)(1000)}{(107033)(1.273)(30.55)}$$

$$= 906.9 \text{ ug/kg}$$

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	A	906.9 ≈ 910	910	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MW
2nd Reviewer: CP

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r^2 ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-06192024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL < samples < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2	L2434640-02		Soil	06/19/2024	Category B
2	F15_0-0.2	L2434640-13		Soil	06/19/2024	Category B

Notes:

1 WG1939266-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/26/24	WG1939755-1	1	beta-BHC	22.6	ALL, MB1 (ND)	J/UJ/A
				Endrin Aldehyde	20.1	↓	↓

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1 (DET)	cis-Chlordane	82	JDET/A
				↓
	2 (DET)	cis-Chlordane	91	↓

Comments:_____

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Calibration Date	Instrument	Compound	Standard	(Y) Response	(X) Concentration
6/19/2024	PEST20	Chlordane-1 (CLP 1)	1	0.020367587	0.329
			2	0.035823864	0.755
			3	0.188637152	4.963
			4	0.700312598	19.056
			5	1.576172277	43.179
			6	2.801260852	76.918
			7	6.306939053	173.457

		Calculated	***Reported***
Constant	c =	*0.008370*	*0.0084*
R Squared	r2 =	*1.000*	*0.999*
X Coefficient(s)	m =	*0.0363*	*0.0363*
Correlation Coefficient		*1.000000*	
Coefficient of Determination (r^2)		*1.000000*	*0.999000*

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Calibration Date	Instrument	Compound	Standard	(Y) Response	(X) Concentration
6/19/2024	PEST20	Chlordane-1 (CLP 2)	1	0.022856595	0.259
			2	0.045907469	0.990
			3	0.149832818	4.290
			4	0.674434024	20.944
			5	1.303687559	40.921
			6	2.464891936	77.795
			7	5.069291405	160.463

Regression Output		*Calculated*	*Reported*
Constant	c =	*0.014669*	*0.0147*
R Squared	r2 =	*1.000*	*0.999*
X Coefficient(s)	m =	*0.0315*	*0.0315*
Correlation Coefficient		*1.000000*	
Coefficient of Determination (r^2)		*1.000000*	*0.999000*

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1939755-1	06/26/24	Dieldrin (CLP1)	1.268	1.252	1.251	1.3	1.3
			Dieldrin (CLP2)	1.203	1.201	1.201	0.2	0.2
			Compound	Concentration (CCV)	Reported Concentration	Recalculated Concentration	Reported % D	Reported % D
			Chlordane-1 (CLP1)	1000.00	885.520	885.521	11.4	11.4
			Chlordane-1 (CLP2)	1000.00	1031.678	1031.961	3.2	3.2

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	26.607	53	53	0
Tetrachloro-m- xylene	RTX-CLP2	50	29.336	59	59	0
Decachlorobiphenyl	RTX-CLP1	50	32.156	64	64	0
Decachlorobiphenyl	RTX-CLP2	50	44.471	89	89	0

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1939266-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.90	32.30	32.50	30.80	99	99	95	95	4	4
4,4'-DDD	32.90	32.30	32.00	30.40	97	97	94	94	3	3

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Concentration = ((Ax-(b))/m (LINEAR)

Final Conc = $\frac{\text{Conc} * Vp * DF}{(Vs)}$

Concentration = $\frac{(Ax)(Vp)(DF)}{(CF)(Vs)}$ (CF)

b = constant
m = slope

Where:
Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Ax/Ais	%S	Cis	DF	r2 coeff b	r2 coeff m	Vp (ml)	Vs (g)	Conc on-column	Calculated Concentration (ug/L)	Reported Concentration (total)	% Diff
2	chlordane-1	0.1192	81.0	25.0	1.0	0.0084	0.0363	10	15.45	76.256	76.256	674.000	-
											Chlordane total (ug/Kg)		
	Chlordane-Total=	(76.256+858.930+1605.245)							Conc=	(847ug/L)*(10mL)		676.7	
		3								(15.26g)(0.81)			
	=	846.8103333								676.66			

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer: CL

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank ~~/IS~~	N	
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2	L2434640-02		Soil	06/19/2024	Category B

Notes:

1 WG1939106-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943T

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST2	2/5/2024	1260-1 (CLP1)	0.078	0.078	0.074	0.074	17.16	17.45
			1260-1 (CLP2)	0.073	0.073	0.071	0.071	13.25	13.12

LDC#: 60943T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1939464-1	06/26/24	1260-1 (CLP1)	0.074	0.072	0.072	2.7	2.7
			1260-1 (CLP2)	0.071	0.078	0.078	9.9	9.9

LDC#: 60943T

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	327.691	66	66	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	348.459	70	70	0
Decachlorobiphenyl	RTX-CLP1	500.00	361.264	72	72	0
Decachlorobiphenyl	RTX-CLP2	500.00	362.077	72	72	0

LDC#: 60943T

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1939106-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	304	289	190	184	63	63	64	64	3	2

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
1	1260-1	3.561E+08	628900000	250	0.074	5.00	10.28	1.00	N/A	**1912.928**	1915.761	0
	1260-Total =	(1915.761+1975.885+1890.665+2037.149+1932.287)						conc =	(19550)(5mL)		**final conc**	
			5						(10.28 g) (5mL)		**(ug/Kg)**	
	=	1950.35						=	**190**		190	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06192024 from same SDG
VI	Surrogate Spikes / IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2	L2434640-02		Soil	06/19/2024	Category B
2	F15_0-0.2	L2434640-13		Soil	06/19/2024	Category B

Notes:

1 WG1938703-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST22	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
			2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938492-7	06/25/24	2,4-D (CLP1)	0.240	0.261	0.261	8.8	8.8
			2,4-D (CLP2)	0.237	0.262	0.262	10.5	10.4

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.424	85	85	0
DCAA	RTX-CLP2	0.500	0.419	84	84	0

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: WG1938703-4/5

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	213	216	0	208	210	98	98	97	97	1	1

LDC# 60943T

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1938703-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	164	163	147	156	89	90	96	96	8	7

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	3.328E+08	7.761E+08	0.250	0.240	1.00	30.41	1.00	NA	**147**	**147**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434640
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E12_0.2-2	L2434640-02	Metals, Wet Chemistry
F15_0-0.2	L2434640-13	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06192024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 19, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Aluminum	1.44 mg/Kg	7.200 mg/Kg	E12_0.2-2
	Antimony	0.196 mg/Kg	0.980 mg/Kg	F15_0-0.2
	Iron	2.36 mg/Kg	11.800 mg/Kg	
	Manganese	0.09 mg/Kg	0.450 mg/Kg	
ICB/CCB	Arsenic	0.00277 mg/L	0.554 mg/Kg	E12_0.2-2
ICB/CCB	Arsenic	0.00212 mg/L	0.424 mg/Kg	F15_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06192024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06192024	Barium	0.00025 mg/L	0.00125 mg/Kg	E12_0.2-2 F15_0-0.2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06192024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
E12_0-0.2MS/MSD (E12_0.2-2 F15_0-0.2)	Calcium	546 (75-125)	-	J (all detects)
	Lead	149 (75-125)	154 (75-125)	J (all detects)
	Magnesium	-	136 (75-125)	J (all detects)
	Potassium	127 (75-125)	-	J (all detects)
	Zinc	-	136 (75-125)	J (all detects)
E12_0-0.2MS/MSD (E12_0.2-2 F15_0-0.2)	Mercury	14 (80-120)	77 (80-120)	J (all detects)

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
E12_0-0.2MS/MSD (E12_0.2-2 F15_0-0.2)	Calcium Mercury	100 (≤20) 23 (≤20)	J (all detects) J (all detects)

For E12_0-0.2MS/MSD, no data were qualified for several percent recoveries (%R) and relative percent differences (RPD) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Wet Chemistry

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
E12_0-0.2MS/MSD (E12_0.2-2 F15_0-0.2)	Hexavalent chromium	65 (75-125)	65 (75-125)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E12_0.2-2 F15_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB=FB-06192024
VII	Matrix Spike/Matrix Spike Duplicate	SW	E12-0-0.2 MS/MSD
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A ~~A~~	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2X, all except Hg (matrix)	L2434640-02		Soil	06/19/2024	Category B
2	F15_0-0.2	L2434640-13		Soil	06/19/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**					
Al	1.44		7.200					
Sb	0.196		0.980					
Fe	2.36		11.800					
Mn	0.09		0.450					

Sample Concentration, unless otherwise noted: Associated Samples: 1

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
As		0.00277	0.554					

Sample Concentration, unless otherwise noted: Associated Samples: 2

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
As		0.00212	0.424					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/19/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06192024							
Ba	0.00025	0.00125						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943T_metals

VALIDATION FINDINGS WORKSHEETS
Matrix Spike/Matrix Spike Duplicates

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
E12_0-0.2 MS/MSD	soil	Ca	546		75-125			All	Jdet/A	Det
		Pb	149	154	75-125			All	Jdet/A	Det
		Mg		136	75-125			All	Jdet/A	Det
		K	127		75-125			All	Jdet/A	Det
		Zn		136	75-125			All	Jdet/A	Det
		Hg	14	77	80-120			All	J/UJ/A	Det
E12_0-0.2 MS/MSD	soil	Ca				100	20	All	J/UJ/A	Det
		Hg				23	20	All	J/UJ/A	Det

Comments: **E12_0-0.2 MS/MSD: multiple analytes >4x, %R, RPD**

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Cr	0.484	0.500	96.8	97	Y
CCV	ICP	Sb	0.515	0.500	103	103	Y
LLCC	ICP						
ICSAB	ICP	Al	523	500	104.6	105	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	96	Y
CCV	CVAA	Hg	0.0098	0.0100	98	98	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1938878 LCS	LCS	Hg	1.68	1.67	100.5988024	101	Y
E12_0-0.2 MS	MS	Cu	26.7	25.2	105.952381	106	Y
E12_0-0.2 MSD	Duplicate	K	2060	2140	3.80952381	4	Y
E12_0-0.2 PDS	PDS	Mg	890	1010	88.11881188	88	Y
E12_0-0.2 SD	Serial dilution	Mn	379	369	2.7100271	3	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	V	0.3743	2	1.279	50	84	34.7	34.83934622	Y
2	Co	0.1059	2	1.314	50	81	9.92	9.949828062	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943T
SDG #: L2434640
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: CV

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB_06192024
VI	Matrix Spike/Matrix Spike Duplicate	SW	E12_0-0.2 MS/MSD
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL & no samples <RL, no dln.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_0.2-2	L2434640-02		Soil	06/19/2024	Category B
2	F15_0-0.2	L2434640-13		Soil	06/19/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
E12_0-0.2 MS/MSD	soil	Cr(VI)	65	65	75-125			All	J/UJ/A	ND

Comments:

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

Reviewer: NF

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	0.0015	0.999989	0.99998	Y
		s2	0.2	0.00621			
		s3	0.5	0.01705			
		s4	1	0.03116			
		s5	2	0.06526			
		s6	5	0.16653			
		s7	10	0.33575			
		s8	25	0.83455			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10969	0.1		109.69	110	Y
Calibration verification	Cr(VI)	0.212	0.200		106	106	Y
Calibration verification	Cr(VI)	0.211	0.200		105.5	105	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1939284 LCS	LCS	CN-	79	76	103.9473684	104	Y
E12_0-0.2 MS	MS	Cr(VI)	861	1330	64.73684211	65	Y
WG1939284 LCSD	Duplicate	CN-	100	104	3.921568627	4	Y

***Lab used %R to calculated RPD**

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	-0.1044	1	1.0299	50	84	1.2 U	-0.120677458	Y
2	Cr(VI)	0.000	1	2.4711	100	81	0.984 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434763
Reviewer:	Madeline Nicklo and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B12_2-4	L2434763-02	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 11, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/22/24	WG1937971-1	1	Endrin aldehyde	21.1	B12 2-4	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943U
SDG #: L2434763
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MA
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. r^2 ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL < samples <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B12_2-4	L2434763-02		Soil	06/11/2024	Category B

Notes:

1 WG1937670-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/22/24	WG1937971-1	1	Endrin Aldehyde	21.1	ALL, MB1 (ND)	J/UJ/A

LDC# 60943U

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDE (CLP1)	1.138	1.138	1.312	1.312	9.16	9.16
			4,4'-DDE (CLP2)	1.094	1.094	1.208	1.208	8.73	8.73

LDC# 60943U

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1937971-1	06/22/24	Dieldrin (CLP1)	1.268	1.220	1.397	3.8	3.8
			Dieldrin (CLP2)	1.203	1.280	1.292	6.4	6.4
			4,4'-DDE (CLP1)	1.312	1.187	1.148	9.5	9.5
			4,4'-DDE (CLP2)	1.208	1.191	1.076	1.4	1.4

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	34.137	68	68	0
Tetrachloro-m- xylene	RTX-CLP2	50	37.312	75	75	0
Decachlorobiphenyl	RTX-CLP1	50	32.696	65	65	0
Decachlorobiphenyl	RTX-CLP2	50	34.247	68	68	0

LDC# 60943U

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1937670-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.80	33.00	25.70	27.40	78	78	83	83	6	6
4,4'-DDD	32.80	33.00	27.00	28.60	82	82	87	87	5	6

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	1.612E+09	8.795E+07	25	1.208	10.00	15.44	1.00	87	**282**	**282**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2434763
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B13_2-4	L2434763-01	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 11, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Antimony	0.248 mg/Kg	1.240 mg/Kg	B13_2-4
	Arsenic	0.089 mg/Kg	0.445 mg/Kg	
	Calcium	2.98 mg/Kg	14.900 mg/Kg	
	Iron	0.987 mg/Kg	4.935 mg/Kg	
	Lead	0.131 mg/Kg	0.655 mg/Kg	
ICB/CCB	Antimony	0.00643 mg/L	1.286 mg/Kg	B13_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
B13_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943U
SDG #: L2434763
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: [signature]

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B13_2-4 2x, all except Hg (matrix)	L2434763-01		Soil	06/11/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Sb	0.248		1.240					
As	0.089		0.445					
Ca	2.98		14.900					
Fe	0.987		4.935					
Pb	0.131		0.655					
Sb		0.00643	1.286					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Cu	0.503	0.500	100.6	101	Y
CCV	ICP	Fe	0.538	0.500	107.6	108	Y
LLCC	ICP						
ICSAB	ICP	Ca	481	500	96.2	96	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.003	0.0030	100	100	Y
CCV	CVAA	Hg	0.0099	0.0100	99	99	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1936826 LCS	LCS	Ni	37.7	40.0	94.25	94	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Mn	6.4562	2	1.291	50	82	613	609.8694527	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435023
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F10_0.2-2	L2435023-06	VOC, SVOC, Pesticide, PCB, Herbicide
F7_0-0.2	L2435023-18	Pesticide, Herbicide
F10_0.2-2MS	L2435023-06MS	VOC, SVOC, Pesticide, PCB, Herbicide
F10_0.2-2MSD	L2435023-06MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06202024, FB_06202024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 20, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/15/24	ICAL-VOA110	1,4-Dioxane	0.00315 (≥0.005)	F10_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/16/24	ICV-VOA110	Carbon disulfide	33.9	F10_0.2-2	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/26/24	CCV-VOA110	Bromomethane	23.9	F10_0.2-2	UJ (all non-detects)
		Bromoform	22.2		UJ (all non-detects)
		trans-1,4-Dichloro-2-butene	22.4		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
06/26/24	CCV-VOA110	1,4-Dioxane	0.00284 (≥0.005)	F10_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/27/24	CCV-SV103	Bis(2-chloroisopropyl) ether	25.4	F10_0.2-2	UJ (all non-detects)
		2-Nitrophenol	24.7		UJ (all non-detects)
		2,4-Dimethylphenol	36.7		UJ (all non-detects)
		Hexachlorocyclopentadiene	46.1		UJ (all non-detects)
		2,4-Dinitrophenol	31.4		UJ (all non-detects)
		4-Nitrophenol	28.8		UJ (all non-detects)
		4.6-Dinitro-o-cresol	26.9		UJ (all non-detects)
		Bis(2-ethylhexyl)phthalate	24.4		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Herbicide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/23/24	WG1940419-1	1	2,4,5-T	24	F10_0.2-2	UJ (all non-detects)

Pesticide, PCB

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1940224-5Blank	Methylene chloride	2.6 ug/Kg	RL	F10_0.2-2
	Chloroform	0.52 ug/Kg	RL	
	Bromomethane	1.4 ug/Kg	RL	
	Unknown (1.56)	9.71 ug/Kg	RL	
	Unknown (2.48)	4.36 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte TIC (RT in minutes)	Level Detected	Validation Action
F10_0.2-2	Unknown (1.56)	14.3 ug/Kg	14.3U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06202024 for VOC analysis.

Contamination was detected in the field blank FB_06202024 for VOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06202024	Acetone	4.8 ug/Kg	RL	F10_0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06202024 for SVOC, pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
F10_0.2-2MS/MSD (F10_0.2-2)	Methylene chloride	66 (70-130)	-	UJ (all non-detects)
	Bromoform	62 (70-130)	-	UJ (all non-detects)
	1,2-Dichlorobenzene	56 (70-130)	69 (70-130)	UJ (all non-detects)
	1,3-Dichlorobenzene	62 (70-130)	-	UJ (all non-detects)
	1,4-Dichlorobenzene	59 (70-130)	-	UJ (all non-detects)
	Vinyl acetate	47 (70-130)	44 (70-130)	UJ (all non-detects)
	Bromobenzene	66 (70-130)	-	UJ (all non-detects)
	1,2-Dibromo-3-chloropropane	57 (68-130)	-	UJ (all non-detects)
	Hexachlorobutadiene	54 (67-130)	-	UJ (all non-detects)
	Naphthalene	36 (70-130)	46 (70-130)	UJ (all non-detects)
	1,2,3-Trichlorobenzene	31 (70-130)	42 (70-130)	UJ (all non-detects)
	1,2,4-Trichlorobenzene	36 (70-130)	49 (70-130)	UJ (all non-detects)
	1,2,4,5-Tetramethylbenzene	61 (70-130)	-	UJ (all non-detects)
F10_0.2-2MS/MSD (F10_0.2-2)	2,2-Dichloropropane	-	132 (70-130)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
F10_0.2-2MS/MSD (F10_0.2-2)	delta-BHC	286 (30-150)	260 (30-150)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC, PCB, Herbicide

All criteria were met.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, PCB, and herbicide analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Pesticide Analysis Reported
F7_0-0.2	20-fold dilution due to nature of sample matrix

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
F10_0.2-2	cis-Chlordane	85	J (all detects)
	trans-Chlordane	42	J (all detects)
F7_0-0.2	cis-Chlordane	143	J (all detects)
	4,4'-DDD	51	J (all detects)
	trans-Chlordane	92	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: CW
2nd Reviewer:

Method: Volatiles (EPA 8260D) +TIC

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	%D RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06202024
VII	Surrogate Spikes	A	*TB = TB_06202024
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results < RL > MDL = J det
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; *ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2	L2435023-06		Soil	06/20/2024	Category B
2	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
3	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B

Notes:

WG1940224 - SBlank		

LDC #: 60943 √ **VALIDATION FINDINGS CHECKLIST** Page: 1 of 2
Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20 and relative response factors (RRF) ≥ 0.05?	~~✓~~	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943 V

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	5/15/24	ICAL - VOA11D	HHHH		0.00315 (≥0.005)	all	J/UJ/A ND

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943 V

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: EJ

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	5/16/24 0338	ICV-VOA 110	G	33.9	all	J/UJ/A ND

	DOD	NFG
%D	20%	30%

LDC #: 60943 √

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/26/24	CCV-VOA110	B	23.9		all	J/UJ/A ND
	0814		X	22.2		↓	↓
			YYYY	22.4			
			HHHH		0.00284	↓	↓
					(≥0.005)		

LDC #: 60943 ✓

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/26/24 **Associated samples:** All
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1		1						
E	2.6		-						
K	0.52		-						
B	1.4		-						
unknown	9.71 (1.56)		14.3 (1.56)						
↓	4.36 (2.48		-						

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943V

VALIDATION FINDINGS WORKSHEET
Field Blank

Method:GCMS VOA (EPA SW 846 Method 8260 D)

FB = FB_06202024

Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.
Sampling date: 6/20/24 unit= ng/kg
Field blank type: (circle one) Trip Blank / Field Blank / Rinsate / Other:
(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Associated sample units: ng/kg
Associated samples: All (ND)

Analyte	Blank ID	Sample Identification						
	FB							
F	4.8							

Sampling date:
Field blank type: (circle one) Trip Blank/Field Blank / Rinsate / Other:
(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Associated sample units:
Associated samples:

Analyte	Blank ID	Sample Identification						

LDC #: 60943 ✓

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FD

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.
Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2+3	E	66		70-130			#1	J/UJ/A all ND
	X	62		↓				
	JJJ	56	69	↓				
	FFF	62		↓				
	HHH	59		↓				
	HH	47	44	↓				
	OO		132	↓				J(all)/A
	WW	66		↓				J/UJ/A
	MM	57		68-130				
	LLL	54		67-130				
	MMM	36	46	70-130				
	NNN	31	42	↓				
	KKK	36	49	↓				
	A2	61		↓				

LDC #: 60943V

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound		Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL VOA110	5/15/2024	V	(IS 1)	0.860	0.860	0.873	0.873	6.71	6.71
			CC	(IS 2)	0.688	0.688	0.719	0.719	7.85	7.85
			BB	(IS 3)	0.600	0.600	0.634	0.634	3.02	3.02

LDC # 60943 V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccV VOA 110	6/26/24 0814	V	0.873	0.866	0.866	0.8	0.8
			cc	0.719	0.688	0.688	4.3	4.3
			BB	0.634	0.642	0.642	1.3	1.3

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943V

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.044	99	99	0
1,2-Dichloroethane-d4		24.660	124	124	
Toluene-d8		20.810	103	103	
4-Bromofluorobenzene		20.815	108	108	

LDC # 60943 √

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 2 + 3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	177	176	ND	140	160	80	80	93	93	14	13.3
Trichloroethene				170	200	96	96	112	112	15	15.2
Benzene				170	200	97	97	114	114	16	16.2
Toluene			1.0	160	200	93	93	111	111	17	17
Chlorobenzene			ND	140	160	78	78	93	93	17	13

LDC # 60943V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940224-LCSD

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	34.633	28.250	87	87	71	71	20	20.30
Trichloroethene	↓	↓	40.521	37.078	101	101	93	93	8	8.81
Benzene			39.673	35.846	99	99	90	90	10	10.14
Toluene			38.294	35.069	96	96	88	88	9	8.79
Chlorobenzene			37.536	35.130	94	94	88	88	7	6.62

LDC #: 60943 V

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

#1 cc

Concentration = $\frac{(2677)(20)(5)}{(116239)(0.719)(4.5)(0.71)}$

1.00 ug/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	cc	1.00	1.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: CF
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)
+ TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_06202024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	No Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2	L2435023-06		Soil	06/20/2024	Category B
2	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
3	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B

Notes:

WG1939970-1		

LDC #: 60943V

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓	✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943 V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/27/24	CCV - SV103	MMM	25.4		All	J/UJ/A NP
	0630		N	24.7			
			O	36.7			
			X	46.1			
			HH	31.4			
			II	28.8			
			4,6-Dinitro-o-cresol	26.9			
			EEE	24.4			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV103	12/17/2023	A	1.647	1.647	1.654	1.654	2.74	2.74
			S	1.018	1.018	1.031	1.031	2.34	2.34
			GG	1.065	1.065	1.111	1.111	4.74	4.74
			UU	1.079	1.079	1.093	1.093	3.08	3.08
			DDD	1.272	1.272	1.246	1.246	5.29	5.29
			JJJ	0.985	0.985	1.019	1.019	6.42	6.42

LDC # 60943 V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV SV103	6/27/24	A	1.654	1.611	1.611	2.6	2.6
			S	1.031	1.047	1.047	1.6	1.6
			GG	1.111	1.112	1.112	0.1	0.1
			HH	1.093	1.076	1.076	1.6	1.6
			DDD	1.246	1.335	1.335	7.1	7.1
			JJJ	1.019	1.046	1.046	2.6	2.6

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943V

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 6

Surrogate	Surrogate Spiked (ug/kg)	Surrogate Found (ug/kg)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	19.793	79	79	0
2-Fluorobiphenyl	↓	16.00	64	64	↓
Terphenyl-d14	↓	12.973	52	52	↓
Phenol-d5	50.0	37.722	75	75	↓
2-Fluorophenol	↓	38.716	77	77	↓
2,4,6-Tribromophenol	↓	30.483	61	61	↓

LDC # 60943V

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration, MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

Sample: 2 + 3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1860	1870	ND	1300	1500	70	70	80	80	14	14.3
N-Nitroso-di-n-propylamine	↓	↓	↓	1400	1600	75	75	86	86	13	13.3
4-Chloro-3-methylphenol	↓	↓	↓	1400	1600	75	75	86	86	13	13.3
Acenaphthene	↓	↓	↓	1200	1300	64	64	70	70	8	8.0
Pentachlorophenol	↓	↓	↓	1200	1400	64	64	75	75	15	15.4
Pyrene	↓	↓	↓	1100	1300	59	59	70	70	17	16.7

LDC # 60943 V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1939970 - LCS ID

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	29.324	31.775	73	73	79	79	8	8.0
N-Nitroso-di-n-propylamine			30.988	33.529	77	77	84	84	9	7.9
4-Chloro-3-methylphenol			32.504	35.018	81	81	88	88	8	7.4
Acenaphthene			28.993	30.103	~~960~~ 72	72	~~98~~ 75	75	4	3.8
Pentachlorophenol			27.843	28.296	70	70	71	71	1	1.6
Pyrene	↓	↓	29.892	30.779	75	75	77	77	3	2.9

LDC #: 60943 V

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

WG1939970-2 (LCS) S

Concentration = $\frac{(300790)(40)(1)(1000)}{(400835)(1.031)(30.21)}$

963.71 ug/kg

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	S	963.71 = 960	960	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD ≤ 20%. r^2 ICV ≤ 20%.
III	Continuing Calibration	A	%D ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06202024 from same SDG
VI	Surrogate Spikes / IS	/ A	
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL < samples < RL, Jdet/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2	L2435023-06		Soil	06/20/2024	Category B
2	F7_0-0.2 x 20	L2435023-18		Soil	06/20/2024	Category B
3	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
4	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B

Notes:

1 WG1939743-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.
Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	Delta-BHC	286	260	30-150			1 (ND)	JDET/A

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1 (DET)	cis-Chlordane	85	JDET/A
	↓	trans-Chlordane	42	↓
	2 (DET)	cis-Chlordane	143	
	↓	4,4'-DDD	51	
	↓	trans-Chlordane	92	↓

Comments:_____

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDD (CLP1)	1.056	1.056	1.101	1.101	14.71	14.69
			4,4'-DDD (CLP2)	0.993	0.993	0.996	0.996	8.01	8.00

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940712-1 PEST20	06/28/24	Dieldrin (CLP1)	1.268	1.446	1.445	14.0	14.0
			Dieldrin (CLP2)	1.203	1.385	1.385	15.1	15.1
			4,4'-DDT (CLP1)	1.112	1.189	1.189	6.9	6.9
			4,4'-DDT (CLP2)	1.087	1.132	1.132	4.1	4.1

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940414-1 PEST15	06/27/24	Dieldrin (CLP1)	1.322	1.286	1.286	2.7	2.7
			Dieldrin (CLP2)	1.156	1.276	1.276	10.4	10.4
			4,4'-DDD (CLP1)	1.101	1.046	1.046	5.0	5.0
			4,4'-DDD (CLP2)	0.996	1.053	1.053	5.7	5.7

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	33.678	67	67	0
Tetrachloro-m- xylene	RTX-CLP2	50	37.533	75	75	0
Decachlorobiphenyl	RTX-CLP1	50	35.355	71	71	0
Decachlorobiphenyl	RTX-CLP2	50	47.606	95	95	0

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	46.8	45.8	223.00	279.0	258.0	120	120	76	76	8	8
4,4'-DDD	46.8	45.8	0.0	48.7	42.4	104	104	93	93	14	14

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID:WG1939743-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.40	32.40	31.70	30.30	98	98	94	94	4	5
4,4'-DDD	32.40	32.40	32.60	31.40	101	101	97	97	4	4

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDT	6.989E+08	9.664E+07	25	1.087	10.00	15.02	20.00	75	**2953**	**2960**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD ≤ 20%. ICV ≤ 20%
III	Continuing Calibration	A	%D ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-06202024
VI	Surrogate Spikes / IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No result < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2	L2435023-06		Soil	06/20/2024	Category B
2	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
3	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B

Notes:

1 WG1939981-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943V

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/12/2024	1260-1 (CLP1)	0.058	0.058	0.055	0.055	2.68	2.90
			1260-1 (CLP2)	0.048	0.048	0.049	0.049	4.36	4.46

LDC#: 60943V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940066-2	06/27/24	1260-1 (CLP1)	0.055	0.050	0.050	9.1	9.6
			1260-1 (CLP2)	0.049	0.046	0.046	6.1	6.1

LDC#: 60943V

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	355.609	71	71	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	390.620	78	78	0
Decachlorobiphenyl	RTX-CLP1	500.00	428.968	86	86	0
Decachlorobiphenyl	RTX-CLP2	500.00	451.257	90	90	0

LDC#: 60943V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1939981-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	311	299	222	249	71	71	83	83	14	15

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	1.395E+08	287000000	250	0.055	5.00	10.06	1.00	N/A	**2197.958**	2196.177	0
	1260-Total =	(2196.177+2286.433+2233.648+2221.203+2249.424)						conc =	(2237)(5mL)		**final conc**	
			5						(10.06 g) (5mL)		**(ug/Kg)**	
	=	2237.38						=	**222**		222	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-06202024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2	L2435023-06		Soil	06/20/2024	Category B
2	F7_0-0.2	L2435023-18		Soil	06/20/2024	Category B
3	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
4	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B

Notes:

1 WG1939865-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Herbicides (EPA SW-846 Method 8151A)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/23/24	WG1940419-1	1	2,4,5-T	24	1, MB1 (ND)	J/UJ/A

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	4/12/2024	2,4-D (CLP1)	0.230	0.230	0.240	0.240	14.63	14.72
	PEST22		2,4-D (CLP2)	0.223	0.223	0.237	0.237	11.43	11.46

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940419-1	06/27/24	2,4-D (CLP1)	0.240	0.242	0.242	0.8	0.8
			2,4-D (CLP2)	0.237	0.278	0.278	17.3	17.1

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940419-2	06/27/24	2,4-D (CLP1)	0.240	0.261	0.261	8.8	8.8
			2,4-D (CLP2)	0.237	0.250	0.250	5.5	5.3

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.486	97	97	0
DCAA	RTX-CLP2	0.500	0.412	82	82	0

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	233	234	0	193	214	83	83	91	91	10	10

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1939865-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	163	141	130	87	87	80	80	8	9

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	3.521E+08	8.475E+08	0.250	0.240	1.00	30.69	1.00	NA	**141**	**141**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435023
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F10_0.2-2	L2435023-06	Metals, Wet Chemistry
F7_0-0.2	L2435023-18	Metals, Wet Chemistry
F10_0.2-2MS	L2435023-06MS	Metals, Wet Chemistry
F10_0.2-2MSD	L2435023-06MSD	Metals, Wet Chemistry
F10_0.2-2DUP	L2435023-06DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06202024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 20, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.899 mg/Kg	4.495 mg/Kg	F10_0.2-2
	Zinc	0.143 mg/Kg	0.715 mg/Kg	F7_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06202024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06202024	Barium	0.00032 mg/L	0.0016 mg/Kg	F10_0.2-2
	Chromium	0.00020 mg/L	0.001 mg/Kg	F7_0-0.2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_06202024 for the wet chemistry analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06202024	Cyanide	0.004 mg/L	0.02 mg/Kg	F10_0.2-2 F7_0-0.2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
F10_0.2-2MS/MSD (F10_0.2-2 F7_0-0.2)	Chromium	155	145	J (all detects)
	Lead	140	167	J (all detects)
	Magnesium	195	184	J (all detects)
	Zinc	126	127	J (all detects)

For F10_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
F10_0.2-2 F7_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB=FB_06202024
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2 2x, all except Hg (matrix)	L2435023-06		Soil	06/20/2024	Category B
2	F7_0-0.2 ↓	L2435023-18		Soil	06/20/2024	Category B
3	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
4	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe	0.899		4.495					
Zn	0.143		0.715					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/20/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06202024							
Ba	0.00032	0.0016						
Cr	0.00020	0.001						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943V_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	Cr	155	145	75-125			All	Jdet/A	Det
		Pb	140	167	75-125			All	Jdet/A	Det
		Mg	195	184	75-125			All	Jdet/A	Det
		Zn	126	127	75-125			All	Jdet/A	Det

Comments: **3-4: multiple analytes >4x, %R**

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Al	0.49	0.500	98	98	Y
CCV	ICP	Zn	0.496	0.500	99.2	99	Y
LLCC	ICP						
ICSAB	ICP	Mg	484	500	96.8	97	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	96	Y
CCV	CVAA	Hg	0.0098	0.0100	98	98	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1939416 LCS	LCS	Ag	4.15	4.0	103.75	104	Y
3	MS	Tl	12.4	13.4	92.53731343	93	Y
4	Duplicate	Be	6.26	6.53	4.222048475	4	Y
1 PDS	PDS	Pb	57.1	58.2	98.10996564	98	Y
1 SD	Serial dilution	Al	11100	11200	0.892857143	1	Y

VALIDATION FINDINGS CHECKLIST

Sample Calculation Verification

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	As	0.7094	2	1.289	50	71	78.0	77.51395885	Y
2	Hg (ug/L)	1.237	1	0.399	50	75	0.208	0.206683375	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943V
SDG #: L2435023
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NB
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	SW	FB=FB_06202024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL< no samples<RL, no dil'n.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F10_0.2-2	L2435023-06		Soil	06/20/2024	Category B
2	F7_0-0.2	L2435023-18		Soil	06/20/2024	Category B
3	F10_0.2-2MS	L2435023-06MS	MS	Soil	06/20/2024	Category B
4	F10_0.2-2MSD	L2435023-06MSD	MSD	Soil	06/20/2024	Category B
5	F10_0.2-2DUP	L2435023-06DUP	DUP	Soil	06/20/2024	Category B

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)
QC	
3-4	CN-
3-5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: NF

METHOD: Inorganics

Blank units: mg/L
Sampling Date: 06/20/24

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification							
Analyte	Blank ID	Action Level (mg/kg)								
	FB_06202024									
CN-	0.004	0.02								

Comments: The action level, when applicable, is establised at 5X the highest concentration.

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

Reviewer: NF

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10727	0.1		107.27	107	Y
Calibration verification	Cr(VI)	0.208	0.200		104	104	Y
Calibration verification	Cr(VI)	0.205	0.200		102.5	103	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1939654 LCS	LCS	Cr(VI)	184	192	95.83333333	96	Y
3	MS	CN-	14	14	100	100	Y
4	Duplicate	CN-	95	100	5.128205128	5	Y

***Lab used %R for RPD calculation**

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	0.15677	1	1.077	50	71	1.3 U	0.205016543	Y
2	Cr(VI)	0.000	1	2.4956	100	75	1.07 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435284
Reviewer:	Madeline Nicklo and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A11_4-6	L2435284-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 10, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/24/24	WG1938708-1	2	Endrin aldehyde	20.3	A11 4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943W
SDG #: L2435284
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer: CJ

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% r² ICV≤20%
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A11_4-6	L2435284-01		Soil	06/10/2024	Category B

Notes:

IWG1938126-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/24/24	WG1938708-1	2	Endrin Aldehyde	20.3	ALL, MB1 (ND)	J/UJ/A

LDC# 60943W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60943W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938357-1	06/24/24	Dieldrin (CLP1)	1.275	1.398	1.276	9.6	9.6
			Dieldrin (CLP2)	1.203	1.279	1.279	6.3	6.3
			4,4'-DDT (CLP1)	1.112	1.070	1.070	3.8	3.8
			4,4'-DDT (CLP2)	1.087	1.081	1.081	0.6	0.6

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	41.512	83	83	0
Tetrachloro-m- xylene	RTX-CLP2	50	45.704	91	91	0
Decachlorobiphenyl	RTX-CLP1	50	43.365	87	87	0
Decachlorobiphenyl	RTX-CLP2	50	40.633	81	81	0

LDC# 60943W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1938126-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.20	32.90	35.00	36.20	109	109	110	110	1	1
4,4'-DDD	32.20	32.90	36.00	37.10	112	112	113	113	1	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	Dieldrin	1.198E+08	4.334E+07	25	1.275	10.00	15.55	1.00	N/A	**35**	**35**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435284
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
A12_4-6	L2435284-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 10, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.571 mg/Kg	2.855 mg/Kg	A12 4-6
ICB/CCB	Sodium	0.0362 mg/L	7.24 mg/Kg	A12 4-6

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
A12_4-6	1-fold dilution due to sample matrix for mercury 4-fold dilution due to sample matrix for arsenic and selenium 2-fold dilution due to sample matrix for all metals except mercury, arsenic, and selenium

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943W
SDG #: L2435284
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < Sample < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	A12_4-6 see "notes"	L2435284-02		Soil	06/10/2024	Category B

Notes:

1. Hg 1x, As, Se 4x	all other analytes 2x (matrix)	

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe	0.571		2.855					
Na		0.0362	7.24					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Sb	0.489	0.500	97.8	98	Y
CCV	ICP	Ag	0.532	0.500	106.4	106	Y
LLCC	ICP						
ICSAB	ICP	Mg	474	500	94.8	95	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	95	Y
CCV	CVAA	Hg	0.0099	0.0100	99	99	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1939869 LCS	LCS	Cr	17.3	16.0	108.125	108	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Be	0.0032	2	1.299	50	90	0.279	0.273714823	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435399
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F3_0.2-2	L2435399-06	VOC, SVOC, Pesticide, PCB, Herbicide
G4_0-0.2	L2435399-26	Pesticide, Herbicide
F3_0.2-2MS	L2435399-06MS	VOC, SVOC, Pesticide, PCB, Herbicide
F3_0.2-2MSD	L2435399-06MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06212024, FB_06212024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 21, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/18/24	ICAL-VOA129	1,4-Dioxane	0.00258 (≥0.005)	F3_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/28/24	CCV-VOA129	2-Butanone	20.8	F3_0.2-2	UJ (all non-detects)
		4-Methyl-2-pentanone	24.1		UJ (all non-detects)
		2-Hexanone	30.4		UJ (all non-detects)
		Bromoform	23.7		UJ (all non-detects)
		trans-1,4-Dichloro-2-butene	21.6		UJ (all non-detects)
		1,2-Dibromo-3-chloropropane	27.9		UJ (all non-detects)
		Naphthalene	20.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/28/24	CCV-VOA129	1,4-Dioxane	0.00225	F3_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/28/24	CCV-SV103	Bis(2-chloroisopropyl) ether	31.2	F3_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/29/24	WG1941220-3	1	Toxaphene	20.3	F3_0.2-2	UJ (all non-detects)
06/29/24	WG1941361-1	2	Endrin Aldehyde	20.2	G4_0-0.2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1940335-5	Methylene chloride	2.3 ug/Kg	RL	F3_0.2-2
	Chloroform	0.34 ug/Kg	RL	
	Boric acid, trymethly ester (8.63)	23.1 ug/Kg	RL	
	Cyclotrisiloxane, hexamethyl (14.71)	3.89 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte TIC (RT in minutes)	Level Detected	Validation Action
F3_0.2-2	Cyclotrisiloxane, hexamethyl (14.71)	6.6 ug/Kg	6.6U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06212024 for VOC analysis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06212024 for pesticide, PCB, and herbicide analyses.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
F3_0.2-2MS/MSD (F3_0.2-2)	Vinyl chloride	-	132 (67-130)	UJ (all non-detects)
	Vinyl acetate	28 (70-130)	29 (70-130)	
	Hexachlorobutadiene	58 (67-130)	63 (67-130)	
	Naphthalene	58 (70-130)	54 (70-130)	
	1,2,3-Trichlorobenzene	50 (70-130)	47 (70-130)	
	1,2,4-Trichlorobenzene	55 (70-130)	50 (70-130)	
	1,2,4,5-Tetramethylbenzene	68 (70-130)	64 (70-130)	
F3_0.2-2MS/MSD (F3_0.2-2)	Vinyl chloride	-	132 (67-130)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC, Pesticide, PCB, Herbicide

All criteria were met.

LCS Results

Pesticide

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG1940553-2/3 (F3_0.2-2 G4_0-0.2)	delta-BHC	45	None
	Lindane	45	
	alpha-BHC	47	
	beta-BHC	40	
	Heptachlor	45	
	Aldrin	46	
	Endrin	48	
	Endrin aldehyde	45	
	Endrin ketone	44	
	Endosulfan I	46	
	Endosulfan II	43	
	Endosulfan sulfate	44	
	Methoxychlor	43	
WG1940553-2/3 (F3_0.2-2 G4_0-0.2)	4,4'-DDE	48	J (all detects)
WG1940553-2/3 (F3_0.2-2)	Heptachlor epoxide	44	None
	Dieldrin	46	
	cis-Chlordane	45	
	trans-Chlordane	45	
WG1940553-2/3 (F3_0.2-2)	4,4'-DDD	46	J (all detects)
	4,4'-DDT	44	J (all detects)
WG1940553-2/3 (G4_0-0.2)	4,4'-DDD	46	None
WG1940553-2/3 (G4_0-0.2)	Heptachlor epoxide	44	J (all detects)
	Dieldrin	46	J (all detects)
	4,4'-DDT	44	J (all detects)
	cis-Chlordane	45	J (all detects)
	trans-Chlordane	45	J (all detects)

No data were qualified due to high RPDs when the associated results were non-detected.

VOC, SVOC, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, Pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
G4_0-0.2	cis-Chlordane	108	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: FJ
2nd Reviewer: CL

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	GC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	SW/Δ	%RSD ≤ 20, r ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB_06212024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	Δ	LCS ID
X	Field Duplicate	N	
XI	Internal standards	Δ	
XII	Target Analyte Quantitation	Δ	Result < RL > MDL = Det
XIII	Target Analyte Identification	Δ	
XIV	Overall Assessment of Data	Δ	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1 r	F3_0.2-2 1= B	L2435399-06		Soil	06/21/2024	Category B
2 r	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
3 r	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B

Notes:

1	WG1940335-5		
2	WG1940843-5		

LDC #: 60943 X

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20 % and relative response factors (RRF) ≥ 0.05?	✓	✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30 %?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓	✓	
Were target analytes detected in the field duplicates?				
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	6/18/24	ICAL-VOA129	HHHH	0.00258 (≥0.005)		All	J/UJ/A (ND)

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/28/24 0711	CCV-VOA 129	M	20.8		All	J/UJ/A and ND
			Y	24.1			
			Z	30.4			
			X	23.7			
			YYYY	21.6			
			M M	27.9			
			MM M	20.1			
			HHHH		0.00225 (70.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 6/26/24 **Associated samples:** All
Conc. units: ug/Kg

Compound	Blank ID	Sample Identification							
	MB1		1						
E	2.3		-						
K	0.34		-						
TIC ①	23.1 (8.63)		-						
②	3.89 (14.71)		6.6 (14.71)						
		① Boric acid, trimethyl ester							
		② Cyclotrisiloxane, hexamethyl							

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JL

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2 +3	C		132	67-130			#1	J(all)/A and NA
	HH	28	29	70-130			↓	↓/J/A
	LLL	58	63	67-130				
	MMM	58	54	70-130				
	NNN	50	47	70-130				
	KKK	55	50	70-130				
	A2	68	64	70-130			↓	↓

LDC #:60943X

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	6/18/2024	C	0.245	0.245	0.244	0.244	5.61	5.61
	VOA129		EE	1.480	1.480	1.468	1.468	4.84	4.84
			BB	0.675	0.675	0.699	0.699	6.05	6.05

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA126	6/26/24 2050	B	0.204	0.175	0.175	14.2	14.2

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV VOA 129	6/28/24 0711	C	0.244	0.239	0.239	2	2
			EE	1.468	1.302	1.302	11.3	11.3
			BB	0.699	0.576	0.576	17.6	17.6

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.452	102	102	0
1,2-Dichloroethane-d4		29.984	105	105	
Toluene-d8		19.419	97	97	
4-Bromofluorobenzene		19.987	100	100	

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

MS/MSD ID: 2 + 3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	132	144	ND	160	180	123	121	126	125	10	11.76
Trichloroethene			ND	150	160	109	114	108	111	7	6.45
Benzene			ND	150	160	109	114	108	111	7	6.45
Toluene			1.4	130	140	101	97	98	96	5	7.41
Chlorobenzene			ND	130	130	96	98	90	90	2	0

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940843-3/4

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.0	40.0	36.586	36.646	92	92	92	92	0	0.16
Trichloroethene	↓	↓	36.242	36.859	91	91	92	92	1	1.69
Benzene			35.331	35.001	88	88	88	88	0	0.94
Toluene			32.924	33.168	82	82	83	83	1	0.74
Chlorobenzene			34.793	35.027	87	87	88	88	1	0.67

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

#1 EE

Concentration = $\frac{(17412)(20.0)(5)}{(181382)(1.468)(4.6)(0.76)}$

= 1.87 ug/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

6/28/24 0941

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
#1	EE	1.87	1.9	U

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

+TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F3_0.2-2	L2435399-06		Soil	06/21/2024	Category B
2	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
3	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B

Notes:

WG1940567-1		

LDC #: 60943X

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/28/24 2257	CCV - SY103	MMM	31.2		All	J/UJ/A (ND)

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV103	12/17/2023	A	1.647	1.647	1.654	1.654	2.74	2.74
			S	1.018	1.018	1.031	1.031	2.34	2.34
			GG	1.065	1.065	1.111	1.111	4.74	4.74
			UU	1.079	1.079	1.093	1.093	3.08	3.08
			DDD	1.272	1.272	1.246	1.246	5.29	5.29
			JJJ	0.985	0.985	1.019	1.019	6.42	6.42

LDC # 60943 X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV SV103	6/28/24 2257	A	1.654	1.549	1.549	6.3	6.3
			S	1.031	0.936	0.936	9.2	9.2
			GG	1.111	0.999	0.999	10.1	10.1
			UU	1.093	0.942	0.942	13.8	13.8
			DDD	1.246	1.182	1.182	5.1	5.1
			JJJ	1.019	0.998	0.998	2.1	2.1

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ug/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	21.135	85	85	0
2-Fluorobiphenyl	↓	18.925	76	76	
Terphenyl-d14	↓	18.394	74	74	↓
Phenol-d5	50.0	42.619	85	85	
2-Fluorophenol	↓	42.380	85	85	
2,4,6-Tribromophenol	↓	36.035	72	72	↓

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration, MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

Sample: 2 & 3

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1750	1740	ND	1500	1500	86	86	86	86	0	0
N-Nitroso-di-n-propylamine				1600	1600	92	92	92	92	0	0
4-Chloro-3-methylphenol				1600	1500	92	92	86	86	6	6.5
Acenaphthene				1500	1400	86	86	80	80	7	6.9
Pentachlorophenol				1400	1300	80	80	74	74	7	7.4
Pyrene				1500	1400	86	86	80	80	7	6.9

LDC # 60943X

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1940567- LCS ID

Compound	SA (ug/kg)		SSC (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	34.963	32.839	87	87	82	82	6	6.3
N-Nitroso-di-n-propylamine			36.883	34.351	92	92	86	86	7	7.1
4-Chloro-3-methylphenol			36.381	35.439	91	91	88	88	3	2.6
Acenaphthene			33.018	31.479	82	82	79	79	4	4.8
Pentachlorophenol			29.989	29.331	75	75	73	73	3	2.2
Pyrene	↓	↓	33.386	32.157	83	83	80	80	4	3.8

LDC #: 60943X

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

WG1940567- LCS (A)

Concentration = $\frac{(168850)(40.0)(1)(1000)}{(116782)(1.654)(30.26)}$

1155.5 ug/kg

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	A	1155.5 ≈ 1200	1200	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% r^2 ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_06212024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	SW	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL<Samples<RL, J det/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F3_0.2-2	L2435399-06		Soil	06/21/2024	Category B
2	G4_0-0.2	L2435399-26		Soil	06/21/2024	Category B
3	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
4	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B

Notes:

1 WG1940553-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√	√=		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√		√=	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/29/24	WG1941220-3	1	Toxaphene	20.3	1, MB1 (ND)	J/UJ/A
							↓
		WG1941361-1	2	Endrin Aldehyde	20.2	2, MB2 (ND)	↓

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1940553-2/3	Delta-BHC				45	30	ALL, MB1 (ND)	JDET/P
	Lindane				45			
	Alpha-BHC				47			
	Beta-BHC				40			
	Heptachlor				45			
	Aldrin				46			
	Heptachlor epoxide				44		ALL, MB1, (2 DET)	
	Endrin				48		ALL, MB1 (ND)	
	Endrin aldehyde				45			
	Endrin ketone				44			
	Dieldrin				46		ALL, MB1, (2 DET)	
	4,4'-DDE				48		ALL, MB1 (ALL DET)	
	4,4'-DDD				46		ALL, MB1 (1 DET)	
	4,4'-DDT				44		ALL, MB1, (2 DET)	
	Endosulfan I				46		ALL, MB1 (ND)	
	Endosulfan II				43			
	Endosulfan sulfate				44			
	Methoxychlor				43			
	cis-Chlordane				45		ALL, MB1, (2 DET)	
	trans-Chlordane				45			

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2 (DET)	cis-Chlordane	108	JDET/A

Comments:_____

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Calibration Date	Instrument	Compound	Standard	(Y) Response	(X) Concentration
6/25/2024	PEST11	Chlordane-1 (CLP 1)	1	0.021045247	0.473
			2	0.039068087	0.904
			3	0.174108129	4.139
			4	0.867197062	20.791
			5	1.704044118	40.000
			6	3.401597262	79.918
			7	7.667570499	186.349

		Calculated	***Reported***
Constant	c =	*0.022705*	*0.0077*
R Squared	r2 =	*1.000*	*0.999*
X Coefficient(s)	m =	*0.0412*	*0.0400*
Correlation Coefficient		*0.999882*	
Coefficient of Determination (r^2)		*0.999765*	*0.999000*

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Calibration Date	Instrument	Compound	Standard	(Y) Response	(X) Concentration
6/25/2024	PEST11	Chlordane-1 (CLP 2)	1	0.022165185	0.513
			2	0.040268483	0.978
			3	0.168085052	4.271
			4	0.799856012	20.666
			5	1.571117562	40.000
			6	3.133836651	79.906
			7	7.2623498	189.872

Regression Output		***Calculated***	***Reported***
Constant	c =	*0.017340*	*0.0099*
R Squared	r2 =	*1.000*	*0.999*
X Coefficient(s)	m =	*0.0383*	*0.0374*
Correlation Coefficient		*0.999939*	
Coefficient of Determination (r^2)		*0.999879*	*0.999000*

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	6/25/2024	Dieldrin (CLP1)	1.346	1.347	1.418	1.418	5.52	5.52
			Dieldrin (CLP2)	1.209	1.209	1.286	1.286	5.05	5.06

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941220-1 PEST20	06/29/24	Dieldrin (CLP1)	1.268	1.366	1.366	7.7	7.7
			Dieldrin (CLP2)	1.203	1.252	1.252	4.1	4.1
			4,4'-DDT (CLP1)	1.112	1.140	1.140	2.5	2.5
			4,4'-DDT (CLP2)	1.087	1.029	1.029	5.3	5.3

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941361-1 PEST11	06/30/24	Dieldrin (CLP1)	1.418	1.464	1.464	3.2	3.2
			Dieldrin (CLP2)	1.286	1.320	1.321	2.6	2.6
			Compound	Concentration (CCV)	Reported Concentration	Recalculated Concentration	Reported % D	Reported %D
			Chlordane-1 (CLP1)	1000	1138.547	1138.452	13.9	13.9
			Chlordane-1 (CLP2)	1000	1018.704	1018.650	1.9	1.9

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	24.153	48	48	0
Tetrachloro-m- xylene	RTX-CLP2	50	30.476	61	61	0
Decachlorobiphenyl	RTX-CLP1	50	15.731	31	31	0
Decachlorobiphenyl	RTX-CLP2	50	25.517	51	51	0

LDC# 60943W

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	42.5	43.6	0.00	40.3	39.2	95	95	90	90	3	3
4,4'-DDD	42.5	43.6	3.6	42.5	41.9	92	92	88	88	1	1

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940553-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.30	31.70	14.20	22.30	44	44	70	70	46	46
4,4'-DDD	32.30	31.70	14.40	22.20	44	45	70	70	46	46

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Concentration = ((Ax-(b))/m (LINEAR)

Final Conc = Conc *Vp*DF / (Vs)

Concentration = (Ax)(Vp)(DF) / (CF)(Vs)

b = constant
m = slope

Where:
Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Ax/Ais	%S	Cis	DF	r2 coeff b	r2 coeff m	Vp (ml)	Vs (g)	Conc on-column	Calculated Concentration (ug/L)	Reported Concentration (total)	% Diff
2	chlordane-1	0.0291	92.0	25.0	1.0	0.0099	0.0374	10	15.07	12.831	12.831	15.400	-
											Chlordane total (ug/Kg)		
	Chlordane-Total=	(12.833+15.817+35.316)							Conc=	(21ug/L)*(10mL)		15.4	
		3								(15.07g)(0.92)			
	=	21.322								15.38			

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F3_0.2-2	L2435399-06		Soil	06/21/2024	Category B
2	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
3	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B

Notes:

1 WG1940597-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943X

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest 23	8/25/2023	1260-1 (CLP1)	0.067	0.067	0.062	0.062	15.68	15.72
			1260-1 (CLP2)	0.057	0.057	0.053	0.053	12.18	12.22

LDC#: 60943X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: MN

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940662-2	06/28/24	1260-1 (CLP1)	0.062	0.054	0.054	12.9	13.1
			1260-1 (CLP2)	0.053	0.049	0.049	7.5	7.5

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	319.352	64	64	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	340.771	68	68	0
Decachlorobiphenyl	RTX-CLP1	500.00	380.754	76	76	0
Decachlorobiphenyl	RTX-CLP2	500.00	387.526	78	78	0

LDC#: 60943X

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940597-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	293	297	219	237	75	75	80	80	7	7

LDC#: 60943X

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	5.098E+08	955100000	250	0.062	5.00	10.65	1.00	N/A	**2147.335**	2141.856	0
	1260-Total =	(2141.856+2369.491+2236.089+2474.363+2454.340)						conc =	(2335)(5mL)		**final conc**	
			5						(10.65 g) (5mL)		**(ug/Kg)**	
	=	2335.23						=	**219**		219	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MM
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	A	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06212024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F3_0.2-2	L2435399-06		Soil	06/21/2024	Category B
2	G4_0-0.2	L2435399-26		Soil	06/21/2024	Category B
3	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
4	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B

Notes:

1 WG1939982-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	5/21/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60943X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938572-1	06/28/24	2,4-D (CLP1)	0.132	0.137	0.137	3.8	3.8
			2,4-D (CLP2)	0.217	0.261	0.261	20.3	20.3

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.486	97	97	0
DCAA	RTX-CLP2	0.500	0.412	82	82	0

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	215	217	0	240	207	111	112	95	95	15	15

LDC# 60943V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1939865-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	162	163	145	152	89	90	93	93	4	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/L)	Reported Conc. (ug/L)	% Diff
LCS	2,4-D	2.698E+08	1.059E+09	0.250	0.132	1.00	1000.00	1.00	NA	**4.82**	**4.81**	0
WG1938239-2												

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435399
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F3_0.2-2	L2435399-06	Metals, Wet Chemistry
G4_0-0.2	L2435399-26	Metals, Wet Chemistry
F3_0.2-2MS	L2435399-06MS	Metals, Wet Chemistry
F3_0.2-2MSD	L2435399-06MSD	Metals, Wet Chemistry
F3_0.2-2DUP	L2435399-06DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks:	FB_06212024
Field Duplicate pair:	None Associated

The above-listed soil samples were collected on June 21, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.478 mg/Kg	2.390 mg/Kg	F3_0.2-2 G4_0-0.2
ICB/CCB	Antimony	0.00993 mg/L	1.986 mg/Kg	F3_0.2-2
ICB/CCB	Antimony	0.00647 mg/L	1.294 mg/Kg	G4_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06212024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06212024	Barium	0.00043 mg/L	0.00215 mg/Kg	F3_0.2-2
	Manganese	0.00045 mg/L	0.00225 mg/Kg	G4_0-0.2
	Sodium	0.0584 mg/L	0.292 mg/Kg	

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06212024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For F3_0.2-2MS/MSD, no data were qualified for iron percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1940722 LCS/LCSD (F3_0.2-2)	Cyanide	-	70 (80-120)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
F3_0.2-2 G4_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: [signature]

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB=FB_06212024
VII	Matrix Spike/Matrix Spike Duplicate	SW	3-4: Fe >4x, %R
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL <samples <RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F3_0.2-2 2x, all except Hg (matrix)	L2435399-06		Soil	06/21/2024	Category B
2	G4_0-0.2 ↓	L2435399-26		Soil	06/21/2024	Category B
3	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
4	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Fe	0.478		2.390					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Sb		0.00993	1.986					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 2

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Sb		0.00647	1.294					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/21/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06212024							
Ba	0.00043	0.00215						
Mn	0.00045	0.00225						
Na	0.0584	0.292						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943X_metals

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Be	0.514	0.500	102.8	103	Y
CCV	ICP	V	0.478	0.500	95.6	96	Y
LLCC	ICP						
ICSAB	ICP	Ca	451	500	90.2	90	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	98	Y
CCV	CVAA	Hg	0.0101	0.0100	101	101	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1939928 LCS	LCS	Co	41.6	40.0	104	104	Y
3	MS	Pb	56.7	54.3	104.4198895	104	Y
4	Duplicate	Mg	1070	1140	6.334841629	6	Y
	PDS						
1 SD	Serial dilution	Al	625	629	0.635930048	1	Y

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Fe	31.7962	2	1.331	50	76	3150.0	3143.283641	Y
2	K	6.1485	2	1.305	50	92	513	512.1189405	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943X
SDG #: L2435399
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: CV

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_06212024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	SW	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL < no samples < RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F3_0.2-2	L2435399-06		Soil	06/21/2024	Category B
2	G4_0-0.2	L2435399-26		Soil	06/21/2024	Category B
3	F3_0.2-2MS	L2435399-06MS	MS	Soil	06/21/2024	Category B
4	F3_0.2-2MSD	L2435399-06MSD	MSD	Soil	06/21/2024	Category B
5	F3_0.2-2DUP	L2435399-06DUP	DUP	Soil	06/21/2024	Category B

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)
QC	
3-4	CN-
3-5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?		NO		

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEETS

Laboratory Control Sample/ Laboartaory Control Sample Duplicate

Reviewer: NF

METHOD: Inorganics

A LCS/LCSD was analzyed for each matrix at the required frequencies. All LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

LCS/LCSD ID	Matrix	Analyte	LCS %R	LCSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
WG1940722 LCS/LCSD	soil	CN-		70	80-120			1	J/UJ/P	ND

Comments:

VALIDATION FINDINGS CHECKLIST

Initial and Continuing Calibration Calculation Verification

Reviewer: NF

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.

Calibration date:

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	-0.0018	0.999989	0.99998	Y
		s2	0.2	0.00758			
		s3	0.5	0.01892			
		s4	1	0.03678			
		s5	2	0.07195			
		s6	5	0.17941			
		s7	10	0.36641			
		s8	25	0.91264			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10047	0.1		100.47	100	Y
Calibration verification	Cr(VI)	0.190	0.200		95	95	Y
Calibration verification	Cr(VI)	0.186	0.200		93	93	Y

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1940141 LCS	LCS	Cr(VI)	224	192	116.6666667	117	Y
3	MS	CN-	12	13	92.30769231	93	Y
4	Duplicate	Cr(VI)	88	91	3.351955307	4	Y

***Lab used %R to calculate RPD**

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	-0.07173	1	1.0234	50	76	1.3 U	-0.092223548	Y
2	Cr(VI)	0.000	1	2.4066	100	92	0.870 U	0	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435512
Reviewer:	Madeline Nicklo and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C3_2-4	L2435512-02	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 13, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/29/24	WG1938925-1	2	Endrin aldehyde	20.3	C3 2-4	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Y
SDG #: L2435512
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer: CW

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% r^2 ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL<samples <RL, J(a+)/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C3_2-4	L2435512-02		Soil	06/13/2024	Category B

Notes:

1 WG1938496-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/29/24	WG1938925-1	2	Endrin Aldehyde	20.3	1, MB1 (ND)	J/UJ/A

LDC# 60943Y

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDE (CLP1)	1.316	1.316	1.381	1.381	16.23	16.23
			4,4'-DDE (CLP2)	1.232	1.232	1.211	1.211	5.86	5.86

LDC# 60943Y

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1938925-1 PEST15	06/25/24	Dieldrin (CLP1)	1.322	1.431	1.431	8.2	8.2
			Dieldrin (CLP2)	1.156	1.269	1.269	9.8	9.8
			4,4'-DDE (CLP1)	1.381	1.354	1.354	2.0	2.0
			4,4'-DDE (CLP2)	1.211	1.212	1.212	0.1	0.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	25.322	51	51	0
Tetrachloro-m- xylene	RTX-CLP2	50	28.967	58	58	0
Decachlorobiphenyl	RTX-CLP1	50	31.657	63	63	0
Decachlorobiphenyl	RTX-CLP2	50	32.024	64	64	0

LDC# 60943Y

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940553-2/3___

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	31.60	32.10	21.90	26.70	69	69	83	83	18	19
4,4'-DDD	31.60	32.10	21.40	26.40	68	68	82	82	19	19

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	3.296E+08	1.729E+08	25	1.232	10.00	15.64	1.00	83	**29.8**	**30.4**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435512
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C3_2-4	L2435512-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 13, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.826 mg/Kg	4.130 mg/Kg	C3_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
C3_2-4	4-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Y
SDG #: L2435512
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: [signature]
2nd Reviewer: [signature]

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	~~A~~ SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < sample < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C3_2-4 4x, all except Hg (matrix)	L2435512-02		Soil	06/13/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**					
Fe	0.826		4.130					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Tl	0.484	0.500	96.8	97	Y
CCV	ICP	Sb	0.498	0.500	99.6	100	Y
LLCC	ICP						
ICSAB	ICP	Fe	186	200	93	93	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	95	Y
CCV	CVAA	Hg	0.01	0.0100	100	100	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1938850 LCS	LCS	Ca	802	800.0	100.25	100	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Zn	0.2757	4	1.277	50	83	52.2	52.023285	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435567
Reviewer:	Felomina Tanguilig, Madeline Nicklo, and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G8_0.2-2	L2435567-06	VOC, SVOC, Pesticide, PCB, Herbicide
G13_0-0.2	L2435567-21	Pesticide, Herbicide
G8_0.2-2MS	L2435567-06MS	VOC, SVOC, Pesticide, PCB, Herbicide
G8_0.2-2MSD	L2435567-06MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06242024, FB_06242024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on May 24, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC
Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/01/24	CCV-VOA111	Vinyl acetate	28.4	G8 0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/30/24	CCV-SV124	Hexachlorobutadiene	22.7	G8_0.2-2	UJ (all non-detects)
		2,6-Dinitrotoluene	20.6		UJ (all non-detects)
		4,6-Dinitro-o-cresol	24.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/30/24	WG1941346-4	1	Endrin Aldehyde	27.8	G13_0-0.2	UJ (all non-detects)
07/01/24	WG1941549-3	2	Toxaphene	25.2	G8_0.2-2	UJ (all non-detects)

Herbicide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/30/24	WG1941416-1	2	2,4-D	26.3	G8_0.2-2	UJ (all non-detects)

PCB

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1941712-5	Chloroform	0.49 ug/Kg	RL	G8_0.2-2
	Unkwnown (1.45)	10.9 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte TIC (RT in minutes)	Level Detected	Validation Action
G8_0.2-2	Unkwnown (1.46)	24.3 ug/Kg	24.3U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06242024 for VOC analysis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06242024 for pesticide and herbicide analyses.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
G8_0.2-2MS/MSD (G8_0.2-2)	Tetrachloroethene	56 (70-130)	66 (70-130)	UJ (all non-detects)
	Chlorobenzene	54 (70-130)	58 (70-130)	UJ (all non-detects)
	trans-1,3-Dichloropropene	-	64 (70-130)	UJ (all non-detects)
	cis-1,3-Dichloropropene	-	63 (70-130)	UJ (all non-detects)
	Bromoform	-	64 (70-130)	UJ (all non-detects)
	Toluene	67 (70-130)	-	UJ (all non-detects)
	Ethylbenzene	49 (70-130)	59 (70-130)	UJ (all non-detects)
	1,2-Dichlorobenzene	38 (70-130)	35 (70-130)	UJ (all non-detects)
	1,3-Dichlorobenzene	34 (70-130)	34 (70-130)	UJ (all non-detects)
	1,4-Dichlorobenzene	32 (70-130)	31 (70-130)	UJ (all non-detects)
	m,p-Xylene	46 (70-130)	55 (70-130)	UJ (all non-detects)
	o-Xylene	50 (70-130)	57 (70-130)	UJ (all non-detects)
	Styrene	46 (70-130)	46 (70-130)	UJ (all non-detects)
	2-Butanone	-	62 (70-130)	UJ (all non-detects)
	Vinyl acetate	21 (70-130)	21 (70-130)	UJ (all non-detects)
	4-Methyl-2-pentanone	-	56 (70-130)	UJ (all non-detects)
	Bromobenzene	47 (70-130)	47 (70-130)	UJ (all non-detects)
	n-Butylbenzene	18 (70-130)	26 (70-130)	UJ (all non-detects)
	sec-Butylbenzene	27 (70-130)	39 (70-130)	UJ (all non-detects)
	tert-Butylbenzene	34 (70-130)	45 (70-130)	UJ (all non-detects)
	o-Chlorotoluene	37 (70-130)	44 (70-130)	UJ (all non-detects)
	p-Chlorotoluene	34 (70-130)	39 (70-130)	UJ (all non-detects)
	1,2-Dibromo-3-chloropropane	-	57 (68-130)	UJ (all non-detects)
	Hexachlorobutadiene	11 (70-130)	17 (67-130)	UJ (all non-detects)
	Isopropylbenzene	40 (70-130)	53 (70-130)	UJ (all non-detects)
	p-Isopropyltoluene	23 (70-130)	33 (70-130)	UJ (all non-detects)
	Naphthalene	39 (70-130)	24 (70-130)	UJ (all non-detects)
	Acrylonitrile	-	58 (70-130)	UJ (all non-detects)
	n-Propylbenzene	32 (70-130)	44 (70-130)	UJ (all non-detects)
	1,2,3-Trichlorobenzene	24 (70-130)	17 (70-130)	UJ (all non-detects)
	1,2,4-Trichlorobenzene	24 (70-130)	18 (70-130)	UJ (all non-detects)
	1,3,5-Trimethylbenzene	34 (70-130)	42 (70-130)	UJ (all non-detects)
	1,2,4-Trimethylbenzene	32 (70-130)	39 (70-130)	UJ (all non-detects)
	p-Diethylbenzene	20 (70-130)	27 (70-130)	UJ (all non-detects)
	p-Ethyltoluene	29 (70-130)	40 (70-130)	UJ (all non-detects)
	1,2,4,5-Tetramethylbenzene	24 (70-130)	25 (70-130)	UJ (all non-detects)
	trans-1,4-Dichloro-2-butene	61 (70-130)	31 (70-130)	UJ (all non-detects)

Additional Percent recoveries (%R) were not within the QC limits for G8_0.2-2MS/MSD. No data were qualified since the parent sample results were greater than 4X the spiked concentration.

Relative percent differences (RPD) were not evaluated since the MS and MSD were spiked at different concentrations and not comparable.

SVOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (26-90)	MSD %R (26-90)	Validation Action
G8_0.2-2MS/MSD (G8_0.2-2)	Phenol	91	-	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide

All criteria were met.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, Pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
G13 0-0.2	cis-Chlordane	148	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: EZ
2nd Reviewer: [illegible]

Method: Volatiles (EPA 8260D) + TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A /A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A /A	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB= TB_060242024
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G8_0.2-2	L2435567-06		Soil	06/24/2024	Category B
2	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
3	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B

Notes:

WG1941712-5	VOA III	

LDC #: 60943Z

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20 and relative response factors (RRF) ≥ 0.05?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ ~~20%~~ 30?				
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓	✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	7/1/24 0718	CCV-VOA111	HH	28.4		All	J/UJ/A ND

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 609432

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 7/1/24 **Associated samples:** all
Conc. units: ug/kg

Compound	Blank ID	Sample Identification							
	MB1		1						
K	0.49		-						
unknown	10.9 (1.45)		24.3 (1.46)						

Blank extraction date: **Blank analysis date:** **Associated samples:**
Conc. units:

Compound	Blank ID	Sample Identification							

LDC #: 60943Z

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FD

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.
Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2 + 3	several %R outside limit						#1	
	see following 4 pages							
							all %R = J/UJ/A all ND	
	Due to significant difference in							
	spike amount, %RPDs were							
	not calculated							

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2435567
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: G8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2435567-06	Analysis Date	: 07/01/24 09:23
Matrix Spike	: WG1941712-6	MS Analysis Date	: 07/01/24 09:48
Matrix Spike Dup	: WG1941712-7	MSD Analysis Date	: 07/01/24 10:13

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
Methylene chloride	ND	161	130	79	191	150	81	19	70-130	30
1,1-Dichloroethane	ND	161	160	102	191	200	105	20	70-130	30
Chloroform	ND	161	150	96	191	190	98	19	70-130	30
Carbon tetrachloride	ND	161	150	96	191	190	98	20	70-130	30
1,2-Dichloropropane	ND	161	150	92	191	180	93	19	70-130	30
Dibromochloromethane	ND	161	130	81	191	140	76	10	70-130	30
1,1,2-Trichloroethane	ND	161	130	82	191	150	80	15	70-130	30
Tetrachloroethene A A	ND	161	90	56 Q	191	130	66 Q	33	70-130	30
Chlorobenzene D D	ND	161	87	54 Q	191	110	58 Q	23	70-130	30
Trichlorofluoromethane	ND	161	180	113	191	210	109	14	70-139	30
1,2-Dichloroethane	ND	161	150	91	191	180	92	18	70-130	30
1,1,1-Trichloroethane	ND	161	160	100	191	200	103	20	70-130	30
Bromodichloromethane	ND	161	140	88	191	170	89	18	70-130	30
trans-1,3-Dichloropropene W	ND	161	120	74	191	120	64 Q	3	70-130	30
cis-1,3-Dichloropropene R	ND	161	120	77	191	120	63 Q	2	70-130	30
1,1-Dichloropropene	ND	161	140	88	191	180	94	24	70-130	30
Bromoform X	ND	161	120	75	191	120	64 Q	2	70-130	30
1,1,2,2-Tetrachloroethane	ND	161	130	80	191	140	73	7	70-130	30
Benzene	ND	161	140	87	191	180	92	22	70-130	30
Toluene C C	ND	161	110	67 Q	191	140	73	27	70-130	30
Ethylbenzene E E	ND	161	79	49 Q	191	110	59 Q	36	70-130	30
Chloromethane	ND	161	170	105	191	200	104	17	52-130	30

1/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2435567
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: G8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2435567-06	Analysis Date	: 07/01/24 09:23
Matrix Spike	: WG1941712-6	MS Analysis Date	: 07/01/24 09:48
Matrix Spike Dup	: WG1941712-7	MSD Analysis Date	: 07/01/24 10:13

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
Bromomethane	ND	161	140	86	191	130	69	5	57-147	30
Vinyl chloride	ND	161	180	112	191	220	113	18	67-130	30
Chloroethane	ND	161	180	111	191	210	112	17	50-151	30
1,1-Dichloroethene	ND	161	170	105	191	200	106	18	65-135	30
trans-1,2-Dichloroethene	ND	161	140	86	191	170	90	21	70-130	30
Trichloroethene	ND	161	120	73	191	150	79	25	70-130	30
1,2-Dichlorobenzene JJJ	ND	161	61	38 Q	191	66	35 Q	8	70-130	30
1,3-Dichlorobenzene FFF	ND	161	54	34 Q	191	65	34 Q	19	70-130	30
1,4-Dichlorobenzene HHH	ND	161	52	32 Q	191	59	31 Q	14	70-130	30
Methyl tert butyl ether	ND	161	150	93	191	180	94	18	66-130	30
p/m-Xylene RRR	ND	321	150	46 Q	382	210	55 Q	36 Q	70-130	30
o-Xylene SSS	ND	321	160	50 Q	382	220	57 Q	31 Q	70-130	30
cis-1,2-Dichloroethene	ND	161	140	86	191	170	89	20	70-130	30
Dibromomethane	ND	161	140	89	191	170	91	20	70-130	30
Styrene FF	ND	321	150	46 Q	382	180	46 Q	17	70-130	30
Dichlorodifluoromethane	ND	161	180	109	191	200	105	13	30-146	30
Acetone	ND	161	140	85	191	140	75	4	54-140	30
Carbon disulfide	ND	161	140	85	191	160	83	15	59-130	30
2-Butanone M	ND	161	130	83	191	120	62 Q	13	70-130	30
Vinyl acetate HH	ND	161	34	21 Q	191	40	21 Q	17	70-130	30
4-Methyl-2-pentanone Y	ND	161	120	76	191	110	56 Q	14	70-130	30
1,2,3-Trichloropropane	ND	161	120	75	191	140	71	12	68-130	30

2/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2435567
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: G8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2435567-06	Analysis Date	: 07/01/24 09:23
Matrix Spike	: WG1941712-6	MS Analysis Date	: 07/01/24 09:48
Matrix Spike Dup	: WG1941712-7	MSD Analysis Date	: 07/01/24 10:13

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
2-Hexanone	ND	161	80	50 Q	191	40	21 Q	68 Q	70-130	30
Bromochloromethane	ND	161	140	89	191	180	92	20	70-130	30
2,2-Dichloropropane	ND	161	160	100	191	190	99	17	70-130	30
1,2-Dibromoethane	ND	161	130	80	191	150	76	12	70-130	30
1,3-Dichloropropane	ND	161	130	80	191	150	80	17	69-130	30
1,1,1,2-Tetrachloroethane	ND	161	120	72	191	140	73	19	70-130	30
Bromobenzene WW	ND	161	76	47 Q	191	89	47 Q	17	70-130	30
n-Butylbenzene III	ND	161	30	18 Q	191	51	26 Q	52 Q	70-130	30
sec-Butylbenzene EEE	ND	161	43	27 Q	191	74	39 Q	52 Q	70-130	30
tert-Butylbenzene CCC	ND	161	54	34 Q	191	87	45 Q	46 Q	70-130	30
o-Chlorotoluene ✓	ND	161	60	37 Q	191	84	44 Q	38 Q	70-130	30
p-Chlorotoluene ✓	ND	161	54	34 Q	191	74	39 Q	31 Q	70-130	30
1,2-Dibromo-3-chloropropane MM	ND	161	120	72	191	110	57 Q	5	68-130	30
Hexachlorobutadiene LLL	ND	161	17	11 Q	191	33	17 Q	64 Q	67-130	30
Isopropylbenzene VV	ND	161	65	40 Q	191	100	53 Q	45 Q	70-130	30
p-Isopropyltoluene GGG	ND	161	37	23 Q	191	62	33 Q	51 Q	70-130	30
Naphthalene MMM	ND	161	63	39 Q	191	45	24 Q	33 Q	70-130	30
Acrylonitrile	ND	161	140	88	191	110	58 Q	25	70-130	30
n-Propylbenzene YY	ND	161	51	32 Q	191	84	44 Q	49 Q	70-130	30
1,2,3-Trichlorobenzene NNN	ND	161	39	24 Q	191	32	17 Q	22	70-130	30
1,2,4-Trichlorobenzene KKK	ND	161	38	24 Q	191	34	18 Q	10	70-130	30
1,3,5-Trimethylbenzene AAA	ND	161	54	34 Q	191	81	42 Q	40 Q	70-130	30

3/4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2435567
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: G8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2435567-06	Analysis Date	: 07/01/24 09:23
Matrix Spike	: WG1941712-6	MS Analysis Date	: 07/01/24 09:48
Matrix Spike Dup	: WG1941712-7	MSD Analysis Date	: 07/01/24 10:13

		Matrix Spike Sample			Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
1,2,4-Trimethylbenzene	ND	161	51	32 Q	191	74	39 Q	37 Q	70-130	30
1,4-Dioxane	ND	8030	7200	90	9540	8500	89	17	65-136	30
p-Diethylbenzene	ND	161	32	20 Q	191	52	27 Q	47 Q	70-130	30
p-Ethyltoluene	ND	161	47	29 Q	191	76	40 Q	47 Q	70-130	30
1,2,4,5-Tetramethylbenzene	ND	161	38	24 Q	191	47	25 Q	21	70-130	30
Ethyl ether	ND	161	150	95	191	180	96	19	67-130	30
trans-1,4-Dichloro-2-butene	ND	161	98	61 Q	191	59	31 Q	50 Q	70-130	30

4 | 4

LDC #:60943Z

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 20ug/L std)	Recalculated (RRF 20ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	6/25/2024	V C	0.271	0.271	0.276	0.276	7.11	7.11
	VOA 111	M	CC	0.747	0.747	0.769	0.769	7.13	7.13
			BB	0.665	0.665	0.661	0.661	7.89	7.89

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv VOA 111	7/1/24 0718	DCE	0.276	0.311	0.311	12.7	12.7
			CC	0.769	0.79	0.79	2.7	2.7
			BB	0.661	0.684	0.684	3.5	3.5

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.557	103	103	0
1,2-Dichloroethane-d4	↓	20.794	104	104	
Toluene-d8		19.358	97	97	
4-Bromofluorobenzene	↓	20.322	102	102	↓

LDC # 60943 Z

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

MS/MSD ID: 2 & 3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	161	191	ND	170	200	105	106	106	105	18	16.22
Trichloroethene				120	150	73	74	79	79	25	22.22
Benzene				140	180	87	87	92	94	22	25.0
Toluene				110	140	67	68	73	73	27	24.0
Chlorobenzene	↓	↓		87	110	54	54	58	58	23	23.35

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG194172 - 3/4

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40	40	44.642	42.085	112	~~105~~ 112	105	105	6	5.90
Trichloroethene			42.459	40.820	106	106	102	102	4	3.94
Benzene			42.845	41.746	107	107	104	104	3	2.60
Toluene			41.122	39.030	103	103	98	98	5	5.22
Chlorobenzene			40.888	38.847	102	102	97	97	5	5.12

LDC #: 60943Z

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260 D

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG1941712 - 3 (LCS) V

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(326724)(20.0)}{(160195)(0.952)}$

= 42.847 ug/kg

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	V	42.847	42.845	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: Semivolatiles (EPA 8270E)
+ TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	GC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	A/Δ	%RSD ≤ 20, r ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	Δ	
VI	Field Blank	N	
VII	Surrogate Spikes	Δ	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	Δ	LCS 1D
X	Field Duplicate	N	
XI	Internal standards	Δ	
XII	Target Analyte Quantitation	Δ	ND Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	Δ	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G8_0.2-2	L2435567-06		Soil	06/24/2024	Category B
2	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
3	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B

Notes:

WG1941065-1		

LDC #: 609437

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/30/24 1742	CCV - SY124	U	22.7		All	J/UJ/A ND
			EE	20.6		↓	↓
			4,6-Dinitro-o-cresol	24.1		↓	↓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 60943Z

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.
Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2+3	A	91		26-90			#1	J(UJ) / A ND

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV124	6/4/2024	A	1.407	1.407	1.407	1.407	9.80	9.80
			S	0.969	0.969	0.980	0.980	2.17	2.17
			GG	1.023	1.023	1.013	1.013	2.36	2.36
			UU	0.973	0.973	0.978	0.978	1.82	1.82
			DDD	1.191	1.191	1.188	1.188	3.27	3.27
			JJJ	1.236	1.236	1.264	1.264	6.75	6.75

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV SV124	6/30/24	Δ	1.407	1.451	1.451	3.1	3.1
			S	0.980	0.927	0.927	5.4	5.4
			GG	1.013	0.948	0.948	6.4	6.4
			HH	0.978	0.898	0.898	8.2	8.2
			DDD	1.188	1.198	1.198	0.8	0.8
			JJJ	1.264	1.359	1.359	7.5	7.5

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/ml	Surrogate Found (ug/ml	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	20.310	81	81	0
2-Fluorobiphenyl	↓	22.009	88	88	
Terphenyl-d14	↓	23.482	94	94	↓
Phenol-d5	50.0	43.951	88	88	
2-Fluorophenol	↓	46.579	93	93	
2,4,6-Tribromophenol	↓	49.230	98	98	↓

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration
MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

Sample: 2 + 3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1760	1770	ND	1600	1500	91	91	85	85	6	6.5
N-Nitroso-di-n-propylamine	↓	↓	↓	1600	1500	91	91	85	85	6	6.5
4-Chloro-3-methylphenol	↓	↓	↓	1600	1500	91	91	85	85	6	6.5
Acenaphthene	↓	↓	ND	1400	1300	79	80	73	73	7	7.4
Pentachlorophenol	↓	↓	↓	1500	1400	85	85	79	79	7	6.9
Pyrene	↓	↓	↓	1400	1400	79	80	79	79	0	0

LDC # 60943Z

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG194065 - LCS ID

Compound	SA (ug/ml)		SSC (ng/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40	40	35.336	34.814	88	88	87	87	1	1.5
N-Nitroso-di-n-propylamine			35.743	35.877	89	89	90	90	1	0.4
4-Chloro-3-methylphenol			37.110	36.955	93	93	92	92	1	0.4
Acenaphthene			32.148	31.342	80	80	78	78	3	2.5
Pentachlorophenol			34.682	35.411	87	87	88	88	1	2.1
Pyrene	↓	↓	36.709	36.382	92	92	91	91	1	0.9

LDC #: 60943Z

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

WG1941065 - LCS A

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Concentration = $\frac{133183\ (40.0)\ (1)\ (1000)}{107123\ (\cancel{1.654}\ 1.407\ RF)\ (30.18)}$

= ++ 1171.2 ug/kg

Sample #	Analyte	Calculated Concentration (ug/kg)	Reported Concentration (ug/kg)	% Diff
LCS	A	1171.2 ~ 1200	1200 J	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MAN
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20% ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-06242024 from same SDG
VI	Surrogate Spikes / IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	SW	MDL<samples<RL, Jdet/A
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1 1	G8_0.2-2	L2435567-06		Soil	06/24/2024	Category B
2 2	G13_0-0.2	L2435567-21		Soil	06/24/2024	Category B
3	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
4	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B

Notes:

1 WG1941095-1		
2 WG1941096-1		

Method: Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/30/24	WG1941346-4	1	Endrin Aldehyde	27.8	2, MB2 (ND)	J/UJ/A
							↓
	7/1/24	WG1941549-3	2	Toxaphene	25.2	1, MB1 (ND)	↓

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Method: GC Chlorinated Pesticides (EPA SW-846 Method 8081B)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2 (DET)	cis-Chlordane	148	JDET/A

Comments:_____

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDE (CLP1)	1.316	1.316	1.381	1.381	16.23	16.23
			4,4'-DDE (CLP2)	1.232	1.232	1.211	1.211	5.86	5.86

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941549-1 PEST20	07/01/24	Dieldrin (CLP1)	1.268	1.500	1.500	18.3	18.3
			Dieldrin (CLP2)	1.203	1.388	1.388	15.4	15.4
			4,4'-DDT (CLP1)	1.112	1.047	1.047	5.8	5.8
			4,4'-DDT (CLP2)	1.087	0.956	0.956	12.1	12.1

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941346-4 PEST15	06/30/24	Dieldrin (CLP1)	1.322	1.215	1.215	8.1	8.1
			Dieldrin (CLP2)	1.156	1.262	1.261	9.2	9.2
			4,4'-DDE (CLP1)	1.381	1.145	1.145	17.1	17.1
			4,4'-DDE (CLP2)	1.211	1.211	1.210	0.0	0.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	50	31.193	62	62	0
Tetrachloro-m- xylene	RTX-CLP2	50	37.214	74	74	0
Decachlorobiphenyl	RTX-CLP1	50	30.331	61	61	0
Decachlorobiphenyl	RTX-CLP2	50	35.120	70	70	0

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	43.1	42.9	0.00	41.0	38.4	95	95	90	90	7	7
4,4'-DDD	43.1	42.9	0.0	41.6	39.0	97	97	91	91	6	6

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID:WG1941095-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Dieldrin	32.70	31.90	33.40	33.90	102	102	106	106	4	4
4,4'-DDD	32.70	31.90	33.60	34.50	103	103	108	108	5	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (g)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
1	4,4'-DDE	3.421E+08	2.166E+08	25	1.211	10.00	15.29	1.00	76	**28.1**	**28.1**	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	%D ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	N	~~FB= FB-06242024 from same SDG~~
VI	Surrogate Spikes / IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS / D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G8_0.2-2	L2435567-06		Soil	06/24/2024	Category B
2	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
3	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B

Notes:

1 WG1941092-1		

Method: PCBs (EPA SW 846 Method 8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60943Z

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST2	2/5/2024	1260-1 (CLP1)	0.078	0.078	0.074	0.074	17.16	17.45
			1260-1 (CLP2)	0.073	0.073	0.071	0.071	13.25	13.12

LDC#: 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941608-1	07/01/24	1260-1 (CLP1)	0.074	0.074	0.074	0.0	0.0
			1260-1 (CLP2)	0.071	0.077	0.077	8.5	8.5

LDC#: 60943Z

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500.00	386.527	77	77	0
Tetrachloro-m- xylene	RTX-CLP2	500.00	399.728	80	80	0
Decachlorobiphenyl	RTX-CLP1	500.00	459.803	92	92	0
Decachlorobiphenyl	RTX-CLP2	500.00	470.697	94	94	0

LDC#: 60943Z

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: MN

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	406	407	0	324	295	80	80	72	72	2	9

LDC#: 60943Z

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1941092-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	288	293	227	248	79	79	85	85	7	8

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (ml)	Vi (g)	DF	% Solids	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
LCS	1260-1	3.972E+08	567500000	250	0.074	5.00	10.85	1.00	N/A	**2364.567**	2367.639	0
	1260-Total =	(2367.639+2447.192+2445.140+2574.124+2494.306)						conc =	(2465)(5mL)		**final conc**	
			5						(10.85 g) (5mL)		**(ug/Kg)**	
	=	2465.68						=	**227**		227	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1
Reviewer: MN
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤20%. ICV≤20%.
III	Continuing Calibration	SW	%D≤20
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB-06248024 from same SDG
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	~~A~~ N	~~LCS/D~~
X	Target Analyte Quantitation	A	No results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G8_0.2-2	L2435567-06		Soil	06/24/2024	Category B
2	G13_0-0.2	L2435567-21		Soil	06/24/2024	Category B
3	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
4	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B

Notes:

1 WG1940956-1		

Method: Herbicides (EPA SW 846 Method 8151B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				

Validation Area	Yes	No	NA	Findings/Comments
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to			√	
Were internal standard area counts within ± 50% of the average area calculated during	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Herbicides (EPA SW-846 Method 8151A)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	6/30/24	WG1941416-1	2	2,4-D	26.3	1, MB1 (ND)	J/UJ/A

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	5/21/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941416-1	06/30/24	2,4-D (CLP1)	0.132	0.123	0.123	6.8	6.8
			2,4-D (CLP2)	0.217	0.274	0.274	26.3	26.3

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941416-2	06/30/24	2,4-D (CLP1)	0.132	0.120	0.120	9.1	9.1
			2,4-D (CLP2)	0.217	0.250	0.250	15.2	15.2

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
DCAA	RTX-CLP1	0.500	0.502	100	100	0
DCAA	RTX-CLP2	0.500	0.500	100	100	0

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/kg)		SC (ug/kg)	SSC (ug/kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	224	223	0	206	188	92	92	84	84	9	9

LDC# 60943Z

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940956-2/3

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163	164	128	140	79	79	85	85	7	8

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Final Volume
Vi= Initial weight of sample

Sample ID	Compound	Ax	Ais	Cis	RRF	Vf (mL)	Vo (mL)	DF	% Solids	Calculated Conc. (ug/Kg)	Reported Conc. (ug/Kg)	% Diff
LCS	2,4-D	2.493E+08	1.195E+09	0.250	0.132	1.00	30.71	1.00	NA	**129**	**128**	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435567
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G8_0.2-2	L2435567-06	Metals, Wet Chemistry
G13_0-0.2	L2435567-21	Metals, Wet Chemistry
G8_0.2-2MS	L2435567-06MS	Metals, Wet Chemistry
G8_0.2-2MSD	L2435567-06MSD	Metals, Wet Chemistry
G8_0.2-2DUP	L2435567-06DUP	Wet Chemistry
G13_0-0.2MS	L2435567-21MS	Wet Chemistry
G13_0-0.2DUP	L2435567-21DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06242024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 21, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

Metals

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Validation Action
06/29/24	R1847580-16	Iron	113 (90-110)	G8 0.2-2	J (all detects)

Wet Chemistry

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Calcium	1.77 mg/Kg	8.850 mg/Kg	G8_0.2-2
	Iron	2.01 mg/Kg	10.050 mg/Kg	G13_0-0.2
	Magnesium	0.732 mg/Kg	3.660 mg/Kg	
ICB/CCB	Arsenic	0.00291 mg/L	0.582 mg/Kg	G8_0.2-2
	Beryllium	0.000707 mg/L	0.1414 mg/Kg	
	Iron	0.0444 mg/L	8.88 mg/Kg	
	Selenium	0.00369 mg/L	0.738 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
G8_0.2-2	Selenium	0.381 mg/Kg	2.16U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

Contamination was detected in the field blank sample FB_06242024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06242024	Sodium	0.0716 mg/L	0.358 mg/Kg	G8_0.2-2 G13_0-0.2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06242024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
G8_0.2-2MS/MSD (G8_0.2-2 G13_0-0.2)	Chromium	74	-	J (all detects)
	Zinc	72	67	J (all detects)

For G8_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) and relative percent differences (RPD) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Wet Chemistry

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
G13_0-0.2MS (G13_0-0.2)	Hexavalent chromium	60 (75-125)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

Metals

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
G8_0.2-2 G13_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NJ
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	SW	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06242024
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < samples ≥ RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G8_0.2-2 2x, all except Hg (matrix)	L2435567-06		Soil	06/24/2024	Category B
2	G13_0-0.2	L2435567-21		Soil	06/24/2024	Category B
3	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
4	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: NF

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?		NO		
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
All initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were performed at the required frequency and were within the acceptance limits with the following exceptions:

Date	Time	Calibration ID	Analyte	%R	%R Limits	Associated Samples	Qualification	Det/ND
06/29/24	18:14	R1847580-16	Fe	113	90-110	1	Jdet/A	Det

Comments:

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Ca	1.77		8.850					
Fe	2.01		10.050					
Mg	0.732		3.660					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
As		0.00291	0.582					
Be		0.000707	0.1414					
Fe		0.0444	8.88					
Se		0.00369	0.738	0.381/2.16U				

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Sampling Date:

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06242024							
Na	0.0716	0.358						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 60943Z_metals

VALIDATION FINDINGS WORKSHEETS
Matrix Spike/Matrix Spike Duplicates

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	soil	Cr	74		75-125			All	J/UJ/A	Det
		Zn	72	67	75-125			All	J/UJ/A	Det

Comments: **3-4: multiple analytes >4x, %R, RPD**

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	V	0.504	0.500	100.8	101	Y
CCV	ICP	Pb	0.466	0.500	93.2	93	Y
LLCC	ICP						
ICSAB	ICP	Mg	533	500	106.6	107	Y
ICV	ICP-MS						
CCV	ICP-MS						
LLCC	ICP-MS						
ICSAB	ICP-MS						
ICV	CVAA	Hg	0.0029	0.0030	96.66666667	97	Y
CCV	CVAA	Hg	0.01	0.0100	100	100	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
	Mass Axis			± 0.1 amu
	%RSD			≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1940059 LCS	LCS	Mn	38.2	40.0	95.5	96	Y
3	MS	Cr	15.4	20.8	74.03846154	74	Y
4	Duplicate	V	90.1	87.2	3.271291596	3	Y
1 PDS	PDS	Zn	40.5	54.1	74.86136784	75	Y
	Serial dilution						

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Al	160.9796	2	1.256	50	74	17400.0	17320.06369	Y
2	Pb	0.4646	2	1.305	50	76	46.9	46.8441218	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60943Z
SDG #: L2435567
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_06242024
VI	Matrix Spike/Matrix Spike Duplicate	SW	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	MDL< no samples<RL, no dil.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G8_0.2-2	L2435567-06		Soil	06/24/2024	Category B
2	G13_0-0.2	L2435567-21		Soil	06/24/2024	Category B
3	G8_0.2-2MS	L2435567-06MS	MS	Soil	06/24/2024	Category B
4	G8_0.2-2MSD	L2435567-06MSD	MSD	Soil	06/24/2024	Category B
5	G8_0.2-2DUP	L2435567-06DUP	DUP	Soil	06/24/2024	Category B
6	G13_0-0.2MS	L2435567-21MS	MS	Soil	06/24/2024	Category B
7	G13_0-0.2DUP	L2435567-21DUP	DUP	Soil	06/24/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-
1-2	Cr(VI)
QC	
3-4	CN-
3-7	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
6	soil	Cr(VI)	60	75-125	2	J/UJ/A	ND

Comments:

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	0.00103	0.999992	0.99999	Y
		s2	0.2	0.00741			
		s3	0.5	0.01648			
		s4	1	0.03334			
		s5	2	0.07047			
		s6	5	0.1724			
		s7	10	0.34145			
		s8	25	0.85834			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.10591	0.1		105.91	106	Y
Calibration verification	Cr(VI)	0.207	0.200		103.5	103	Y
Calibration verification	Cr(VI)	0.207	0.200		103.5	103	Y

METHOD: Inorganics
Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1940742 LCS	LCS	Cr(VI)	201	192	104.6875	105	Y
3	MS	CN-	12	12	100	96	Y
4	Duplicate	CN-	13	12	8	8	Y

***Lab used %R for RPD calculation**

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	CN-	0.04601	1	1.0504	50	74	1.3 U	0.05919238	Y
2	Cr(VI)	0.000	1	2.4466	100	76	1.05 U	0	Y

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Terraphase
222 International Drive, Suite 150
Portsmouth, NJ 03801
ATTN: Ms. Madison Ingling
madison.ingling@terraphase.com

June 12, 2025

SUBJECT: Elmwood Preserve - Data Validation

Dear Ms. Ingling,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on April 28, 2025. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #60951:

SDG #	**Fraction**
L2435626, L2435973, L2436258, L2436281, L2436294, L2436308, L2436354, L2436601, L2436873, L2437014, L2437190, L2437361, L2437366, L2437374, L2437556, L2438026, L2438098, L2438208, L2438241, L2439451, L2439480, L2439488, L2439714, L2439718	Pesticide, Metals, VOC, SVOC, Pesticide, PCB, Herbicide, Wet Chemistry, Hexachlorobutadiene, 1,4-Dioxane, PFAS

The data validation was performed under Category B guidelines. The analysis was validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan, Elmwood Preserve (January 2025)
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005 (November 2020)
- USEPA National Functional Guidelines for Inorganic Superfund Data Review, EPA 542-R-20-006 (November 2020)
- Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager

LDC #60951 (Terraphase - Portsmouth, NH / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	VOCs (TO-15)	VOCs (8260D)		SVOCs (8270E)		SVOCs (8270E SIM)
Matrix Type:					Air	Soil	Water	Soil	Water	Water
A	L2435626	4/28/25	5/19/25	Category B						
B	L2435973	4/28/25	5/19/25	Category B		1		1		
C	L2436258	4/28/25	5/19/25	Category B						
D	L2436281	4/28/25	5/19/25	Category B		1		1		
E	L2436294	4/28/25	5/19/25	Category B						
F	L2436308	4/28/25	5/19/25	Category B						
G	L2436354	4/28/25	5/19/25	Category B						
H	L2436601	4/28/25	5/19/25	Category B		1		1		
I	L2436873	4/28/25	5/19/25	Category B						
J	L2437014	4/28/25	5/19/25	Category B		1		1		
K	L2437190	4/28/25	5/19/25	Category B						
L	L2437361	4/28/25	5/19/25	Category B						
M	L2437366	4/28/25	5/19/25	Category B						
N	L2437374	4/28/25	5/19/25	Category B						
O	L2437556	4/28/25	5/19/25	Category B						
P	L2438026	4/28/25	5/19/25	Category B						
Q	L2438098	4/28/25	5/19/25	Category B						
R	L2438208	4/28/25	5/19/25	Category B						
S	L2438241	4/28/25	5/19/25	Category B						
T	L2439451	4/28/25	5/19/25	Category B						
U	L2439480	4/28/25	5/19/25	Category B						
V	L2439488	4/28/25	5/19/25	Category B	3					
W	L2439714	4/28/25	5/19/25	Category B		0	1	0	1	1
X	L2439718	4/28/25	5/19/25	Category B						
Total			PM: PG		**3**	**4**	**1**	**4**	**1**	**1**

Sample counts do not include MS, MSD, DUP

EDD: EQuIS

NYDUSR

WO 20250422

Project# CV04.001.005

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LDC #60951 (Terraphase - Portsmouth, NH / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	1,4-Dioxane (8270E SIM)	Pesticides (8081B)		PCBs (8082A)		VOCs (TO-15SIM)
Matrix Type:					Water	Soil	Water	Soil	Water	Air
A	L2435626	4/28/25	5/19/25	Category B		1				
B	L2435973	4/28/25	5/19/25	Category B		2		1		
C	L2436258	4/28/25	5/19/25	Category B		1				
D	L2436281	4/28/25	5/19/25	Category B		2		1		
E	L2436294	4/28/25	5/19/25	Category B		1				
F	L2436308	4/28/25	5/19/25	Category B		1				
G	L2436354	4/28/25	5/19/25	Category B		1				
H	L2436601	4/28/25	5/19/25	Category B		1		1		
I	L2436873	4/28/25	5/19/25	Category B		1				
J	L2437014	4/28/25	5/19/25	Category B		2		1		
K	L2437190	4/28/25	5/19/25	Category B		1				
L	L2437361	4/28/25	5/19/25	Category B		1				
M	L2437366	4/28/25	5/19/25	Category B		1				
N	L2437374	4/28/25	5/19/25	Category B		1				
O	L2437556	4/28/25	5/19/25	Category B		1				
P	L2438026	4/28/25	5/19/25	Category B		1				
Q	L2438098	4/28/25	5/19/25	Category B		1				
R	L2438208	4/28/25	5/19/25	Category B		1				
S	L2438241	4/28/25	5/19/25	Category B		1				
T	L2439451	4/28/25	5/19/25	Category B		1				
U	L2439480	4/28/25	5/19/25	Category B		1				
V	L2439488	4/28/25	5/19/25	Category B						2
W	L2439714	4/28/25	5/19/25	Category B	1	0	1	0	1	
X	L2439718	4/28/25	5/19/25	Category B						
Total			PM: PG		**1**	**24**	**1**	**4**	**1**	**2**

Sample counts do not include MS, MSD, DUP

EDD: EQuIS

NYDUSR

WO 20250422

Project# CV04.001.005

V:\LOGIN\Terraphase\Elmwood Preserve\60951ST

LDC #60951 (Terraphase - Portsmouth, NH / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	Herbicides (8151A)		PFAS (EPA 1633)	Metals (6010D)	Metals (6020B)
Matrix Type:					Soil	Water	Water	Soil	Water
A	L2435626	4/28/25	5/19/25	Category B				1	
B	L2435973	4/28/25	5/19/25	Category B	2			2	
C	L2436258	4/28/25	5/19/25	Category B				2	
D	L2436281	4/28/25	5/19/25	Category B	2			2	
E	L2436294	4/28/25	5/19/25	Category B				1	
F	L2436308	4/28/25	5/19/25	Category B				1	
G	L2436354	4/28/25	5/19/25	Category B					
H	L2436601	4/28/25	5/19/25	Category B	1			1	
I	L2436873	4/28/25	5/19/25	Category B				1	
J	L2437014	4/28/25	5/19/25	Category B	2			2	
K	L2437190	4/28/25	5/19/25	Category B				1	
L	L2437361	4/28/25	5/19/25	Category B				1	
M	L2437366	4/28/25	5/19/25	Category B				1	
N	L2437374	4/28/25	5/19/25	Category B				1	
O	L2437556	4/28/25	5/19/25	Category B					
P	L2438026	4/28/25	5/19/25	Category B				1	
Q	L2438098	4/28/25	5/19/25	Category B				1	
R	L2438208	4/28/25	5/19/25	Category B				1	
S	L2438241	4/28/25	5/19/25	Category B					
T	L2439451	4/28/25	5/19/25	Category B				1	
U	L2439480	4/28/25	5/19/25	Category B				1	
V	L2439488	4/28/25	5/19/25	Category B					
W	L2439714	4/28/25	5/19/25	Category B		1			1
X	L2439718	4/28/25	5/19/25	Category B			1		
Total			PM: PG		**7**	**1**	**1**	**22**	**1**

Sample counts do not include MS, MSD, DUP

EDD: EQuIS

NYDUSR

WO 20250422

Project# CV04.001.005

V:\LOGIN\Terraphase\Elmwood Preserve\60951ST

LDC #60951 (Terraphase - Portsmouth, NH / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	Mercury (7470A)	Mercury (7471B)	Cyanide (9010C/9012B)		Cr(VI) (7196A)	
Matrix Type:					Water	Soil	Soil	Water	Soil	Water
A	L2435626	4/28/25	5/19/25	Category B		1				
B	L2435973	4/28/25	5/19/25	Category B		2	1		2	
C	L2436258	4/28/25	5/19/25	Category B		2				
D	L2436281	4/28/25	5/19/25	Category B		2	1		2	
E	L2436294	4/28/25	5/19/25	Category B		1				
F	L2436308	4/28/25	5/19/25	Category B		1				
G	L2436354	4/28/25	5/19/25	Category B						
H	L2436601	4/28/25	5/19/25	Category B		1	1		1	
I	L2436873	4/28/25	5/19/25	Category B		1				
J	L2437014	4/28/25	5/19/25	Category B		2	1		2	
K	L2437190	4/28/25	5/19/25	Category B		1				
L	L2437361	4/28/25	5/19/25	Category B		1				
M	L2437366	4/28/25	5/19/25	Category B		1				
N	L2437374	4/28/25	5/19/25	Category B		1				
O	L2437556	4/28/25	5/19/25	Category B						
P	L2438026	4/28/25	5/19/25	Category B		1				
Q	L2438098	4/28/25	5/19/25	Category B		1				
R	L2438208	4/28/25	5/19/25	Category B		1				
S	L2438241	4/28/25	5/19/25	Category B						
T	L2439451	4/28/25	5/19/25	Category B		1				
U	L2439480	4/28/25	5/19/25	Category B		1				
V	L2439488	4/28/25	5/19/25	Category B						
W	L2439714	4/28/25	5/19/25	Category B	1			1		1
X	L2439718	4/28/25	5/19/25	Category B						
Total			PM: PG		**1**	**22**	**4**	**1**	**7**	**1**

Sample counts do not include MS, MSD, DUP

EDD: EQuIS

NYDUSR

WO 20250422

Project# CV04.001.005

V:\LOGIN\Terraphase\Elmwood Preserve\60951ST

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2435626
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B12_4-6	L2435626-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 11, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/26/24	wg1939755-1	CLP1	beta-BHC Endrin aldehyde	22.6 20.1	B12_4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
B12_4-6	Heptachlor epoxide	53.8	J (all detects)
	alpha-Chlordane (cis)	125.8	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951A
SDG #: L2435626
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XII	Target Analyte Identification	SW	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B12_4-6	L2435626-01		Soil	06/11/2024	Category B

Notes:

WG1973896_1BLK		

LDC #: 60951A

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	✓			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	✓			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		✓		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
Were manual integrations performed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	6/26/2024	wg1939755-1	CLP1	beta-BHC	22.6	All (-BLK) (ND)	J/UJ/A
				Endrin Aldehyde	20.1		

LDC #: 60951A

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Heptachlor Epoxide	53.8	J det/A
		alpha-Chlordane (cis)	125.8	

Comments:

LDC# 60951A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1939755-1	06/26/24	Dieldrin (CLP1)	1.268	1.252	1.252	1.3	1.3
			Dieldrin (CLP2)	1.203	1.201	1.201	0.2	0.2
			4,4'-DDT (CLP1)	1.112	1.091	1.091	1.9	1.9
			4,4'-DDT (CLP2)	1.087	1.037	1.037	4.6	4.6

LDC # 60951A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	35.03	70	70	0
Tetrachloro-m- xylene	CLP2	50.0	36.38	73	73	0
Decachlorobiphenyl	CLP1	50.0	37.43	75	75	0
Decachlorobiphenyl	CLP2	50.0	51.24	102	102	0

LDC # 60951A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1938496-1,2 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	50.0	50.0	29.8	37.2	60	60	74	74	21	22
DDT	50.0	50.0	33.5	39.0	67	67	78	78	15	15

LDC # 60951A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDT	104800000	83872657	25	1.0870	10.00	15.66	1.00	0.856	21.4	21.4	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435626
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B8_4-6	L2435626-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 11, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Validation Action
06/30/24	R1847802-20	Iron	114 (90-110)	B8_4-6	J (all detects)

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Chromium Iron Selenium	0.046 mg/Kg 2.42 mg/Kg 0.134 mg/Kg	0.230 mg/Kg 12.100 mg/Kg 0.774 mg/Kg	B8_4-6
ICB/CCB	Selenium	0.1548 mg/L	0.774 mg/Kg	B8_4-6

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
B8 4-6	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951A
SDG #: L2435626
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	SW	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B8_4-6 2X, 6010D, matrix	L2435626-02		Soil	06/11/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?		NO		
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
All initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were performed at the required frequency and were within the acceptance limits with the following exceptions:

Date	Time	Calibration ID	Analyte	%R	%R Limits	Associated Samples	Qualification	Det/ND
06/30/24	21:10	R1847802-20	Iron	114	90-110	All	Jdet/A	Det

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Chromium	0.046		0.230					
Iron	2.42		12.100					
Selenium	0.134	0.1548	0.774					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1847802-3 ICV	ICP	Co	0.5213	0.500	104.26	104	Y
R1847802-20 CCV	ICP	Se	0.4770	0.5000	95.4	95	Y
R1847802-5 ICSA	ICP	Mg	482.5571	500	96.51142	96	Y
R1847915-1 ICV	CVAA	Hg	0.003159	0.00300	105.3	105	Y
R1847915-5 CCV	CVAA	Hg	0.01016	0.0100	101.6	102	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1940480-2	LCS	Hg	1.73133333	1.7	103.6726545	104	Y
WG1940478-2	LCS	As	9.312	9.60	97	97	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Al	195.1278	2	1.288	50	87.2	17400	17373.47926	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435973
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 10, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H13_0.2-2	L2435973-14	VOC, SVOC, Pesticide, PCB, Herbicide
G15_0-0.2	L2435973-01	Pesticide, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06252024, FB_06252024
Field Duplicate pair: G15_0-0.2, DUP_06252024

The above-listed soil samples were collected on June 25, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/18/24	ICAL VOA129	1,4-Dioxane	0.003	H13_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/28/24	V29240628A01.D	2-Butanone	20.8	H13_0.2-2	UJ (all non-detects)
		4-Methyl-2-pentanone	24.1		UJ (all non-detects)
		2-Hexanone	30.4		UJ (all non-detects)
		Bromoform	23.7		UJ (all non-detects)
		trans-1,4-Dichloro-2-butene	21.6		UJ (all non-detects)
		1,2-Dibromo-3-chloropropane	27.9		UJ (all non-detects)
		Naphthalene	20.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/28/24	V29240628A01.D	1,4-Dioxane	0.00225	H13_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/01/24	ABN0701.D	Bis(2-chloroisopropyl)ether	39.7	H13_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/01/24	wg1941637-3	CLP1	Toxaphene	21.2	H13_0.2-2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG1940843-5BLANK	Chloroform	1.3 ug/Kg	RL	H13 0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

Contamination was detected in the trip blank sample TB_06252024 for VOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
TB 06252024	Chloromethane	1.8 ug/L	RL	H13 0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06252024 for pesticide and herbicide analyses.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (26-90)	LCSD %R (26-90)	Validation Action
LCS/LCSD WG1941278-2,3-A (H13_0.2-2)	Phenol	-	95	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

VOC, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Pesticide

Samples G15_0-0.2 and DUP_06252024 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/Kg)		RPD
	G15_0-0.2	DUP_06252024	
Heptachlor	0.465	0.938U	Not calculable
Dieldrin	16.3	13.6	18
4,4'-DDE	12.8	10.9	16
Chlordane	157	15.6U	Not calculable
Heptachlor epoxide	7.92	5.30	40
4,4'-DDT	5.61	4.26	27
cis-Chlordane	16.3	11.6	34
trans-Chlordane	12.4	9.09	31

Herbicide

No results were detected in any of the samples.

VOC, SVOC, PCB

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the SVOC, pesticide, and PCB analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC and herbicide analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Pesticide Analysis Reported
H13_0.2-2	1-fold dilution due to nature of sample matrix
H13_0.2-2	10-fold dilution due to nature of sample matrix

Dilutions were not required for VOC, SVOC, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
G15_0-0.2	Heptachlor	98.6	J (all detects)
	cis-Chlordane	112	J (all detects)
H13_0.2-2	cis-Chlordane	124	J (all detects)
	trans-Chlordane	70	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/A	RSD≤20% r² ICV≤30%
IV	Continuing Calibration	SW	CCV≤20%
V	Laboratory Blanks	SW	
VI	Field Blank	SW	TB = TB-062520 24 (Same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results <RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H13_0.2-2	L2435973-14		Soil	06/25/2024	Category B

Notes:

WG1940843-5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?	√			
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within + 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/18/2024	ICAL VOA129	1,4-Dioxane		0.003 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/28/2024	V29240628A01.D	2-Butanone	20.8		All (ND)	J/UJ/A
			4-Methyl-2-pentanone	24.1			
			2-Hexanone	30.4			
			Bromoform	23.7			
			trans-1,4-Dichloro-2-butene	21.6			
			1,2-Dibromo-3-chloropropane	27.9			
			Naphthalene	20.1			
			1,4-Dioxane		0.00225 (≥0.005)	✓	✓

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: ____06/28/24_____ **Associated samples:**_____All (ND)_____
Conc. units: __ug/Kg_____

Compound	Blank ID	Sample Identification							
	WG1940843-5BLANK								
Chloroform	1.3								

Blank analysis date: _____ **Associated samples:**_____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 6/25/2024 **Blank units:** ug/L **Associated sample units:** ug/Kg
Field blank type: TB **Associated Samples:** ALL (ND)

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	TB_06252024								
Chloromethane	1.8								

Sampling date: _____ **Blank units:** _____ **Associated sample units:** _____

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

LDC #: 60951B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 20 std)	Recalculated RRF (RRF 20 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA129	06/18/24	Benzene (FBZ)	0.871	0.871	0.927	0.927	7.72	7.73
			Ethylbenzene (CBZ)	1.410	1.410	1.468	1.468	4.84	4.83
			Naphthalene (DCB)	2.173	2.173	2.254	2.254	4.02	4.02

LDC #: 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V29240628A01.D	06/28/24	Benzene	(FBZ)	0.927	0.819	0.819	11.7	11.7
			Ethylbenzene	(CBZ)	1.468	1.302	1.302	11.3	11.3
			Naphthalene	(DCB)	2.254	1.802	1.802	20.1	20.1

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.75	104	104	0
1,2-Dichloroethane-d4	20.0	21.29	106	106	0
Toluene-d8	20.0	19.15	96	96	0
4-Bromofluorobenzene	20.0	19.24	96	96	0

VALIDATION FINDINGS WORKSHEET

LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 * SSC/SA

Where:

SSC = Spiked concentration

SA = Spike added

LCS = Laboratory control spike recovery

LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1940843-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	36.586	36.646	92	91	92	92	0	0
Benzene	40.00	40.00	35.331	35.001	88	88	88	88	0	1
Trichloroethene	40.00	40.00	36.242	36.859	91	91	92	92	1	2
Toluene	40.00	40.00	32.924	33.168	82	82	83	83	1	1
Chlorobenzene	40.00	40.00	34.793	35.027	87	87	88	88	1	1

VALIDATION FINDINGS WORKSHEET

Sample Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
LCS	Benzene	422401	257830	20.0	0.927	1.0	5.00	5.00	na	35.329	35.331	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A / A	RSD ≤ 20%. or %D ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results <RL> MDL = J dets
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H13_0.2-2	L2435973-14		Soil	06/25/2024	Category B

Notes:

WG1941278-1 BLK		

VALIDATION FINDINGS CHECKLIST

Method: SVOA (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?		√		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within + 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤ 20%)	RRF (Limits)	Associated samples	Qualifications
	7/1/2024	ABN0701.D	Bis(2-chloroisopropyl)ether	39.7		ALL (ND)	J/UJ/A

DOD
%D 20%/50%

NFG
Method criteria

RRF: 0.05

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
LCS/D WG1941278-2,3-A	Phenol	-	95	26-90			All (ND)	J det/P

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL JULIET	4/5/2024	Phenol (DCB)	1.544	1.544	1.419	1.419	5.48	5.48
			Naphthalene (NPT)	1.018	1.018	0.969	0.969	5.84	5.84
			Diethylphthalate (ANT)	1.323	1.323	1.253	1.253	4.14	4.14
			Fluoranthene (PHN)	1.179	1.179	1.089	1.089	8.96	8.96
			Chrysene (CRY)	1.256	1.256	1.221	1.221	1.79	1.79
			Benzo(g,h,i)perylene (PRY)	1.071	1.071	0.953	0.953	9.90	9.90

LDC#: 60951B

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0701	07/01/24	Phenol (DCB)	1.419	1.399	1.399	1.4	1.4
			Naphthalene (NPT)	0.969	0.877	0.877	9.5	9.5
	JULIET.		Diethylphthalate (ANT)	1.253	1.232	1.232	1.7	1.7
			Fluoranthene (PHN)	1.089	1.101	1.101	1.1	1.1
			Chrysene (CRY)	1.221	1.109	1.109	9.2	9.2
			Benzo(g,h,i)perylene (PRY)	0.953	0.943	0.943	1.0	1.0

LDC # 60951B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	27.989	112	112	0
2-Fluorobiphenyl	25.000	26.288	105	105	0
Terphenyl-d14	25.000	25.406	102	102	0
Phenol-d5	50.000	53.309	107	107	0
2-Fluorophenol	50.000	48.932	98	98	0
2,4,6-Tribromophenol	50.000	43.339	87	87	0

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1941278-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	34.294	38.052	86	86	95	95	10	10
N-Nitroso-di-n-propylamine	40.0	40.0	34.110	38.551	85	85	96	96	12	12
4-Chloro-3-methylphenol	40.0	40.0	33.958	37.242	85	85	93	93	9	9
Acenaphthene	40.0	40.0	31.913	36.111	80	80	90	90	12	12
Pentachlorophenol	40.0	40.0	23.576	23.544	59	59	59	59	0	0
Pyrene	40.0	40.0	34.037	38.196	85	85	95	95	11	12

LDC # 60951B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Fluoranthene	24930	906452	40.0	1.089	1.00	1000.0	30.90	0.7852	41.6	42.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer: CF

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD≤20% or ICV≤20%
IV	Continuing Calibration	SW	CCV≤20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB=FB_06252024 (same SDG)
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	SW	D=1/DUP_06252024 (same SDG)
XI	Target Analyte Quantitation	SW	Results <RL >MDL = Jdets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G15_0-0.2	L2435973-01		Soil	06/25/2024	Category B
2	H13_0.2-2 1X, 10X	L2435973-14		Soil	06/25/2024	Category B

Notes:

WG1941273-1 Blk	(1)	
WG1941276-1 LCS	(2)	

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/1/2024	wg1941637-3	CLP1	Toxaphene	21.2	2, MB2 (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Compound	Concentration (ug/Kg)		RPD
	1	DUP_06252024	
Heptachlor	0.465	0.938U	NC
Dieldrin	16.3	13.6	18
4,4'-DDE	12.8	10.9	16
Chlordane	157	15.6U	NC
Heptachlor epoxide	7.92	5.30	40
4,4'-DDT	5.61	4.26	27
cis-Chlordane	16.3	11.6	34
trans-Chlordane	12.4	9.09	31

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Heptachlor	98.6	J det/A
		cis-Chlordane	112	
	2	cis-Chlordane	124	
		trans-Chlordane (gamma-Chlordane)	70	

Comments:

LDC# 60951B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10
2	ICAL PEST11	6/25/2024	Dieldrin (CLP1)	1.346	1.347	1.418	1.418	5.52	5.52
			Dieldrin (CLP2)	1.209	1.209	1.286	1.286	5.05	5.06
			4,4'-DDD (CLP1)	1.092	1.092	1.114	1.115	5.64	5.64
			4,4'-DDD (CLP2)	0.980	0.980	1.025	1.025	5.90	5.91

LDC# 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941876-1 PEST18	07/01/24	Dieldrin (CLP1)	1.294	1.469	1.469	13.5	13.5
			Dieldrin (CLP2)	1.124	1.299	1.299	15.5	15.5
			4,4'-DDD (CLP1)	1.056	1.208	1.208	14.4	14.4
			4,4'-DDD (CLP2)	0.929	1.061	1.061	14.2	14.2
2	WG1941637-4 PEST11	07/01/24	Dieldrin (CLP1)	1.418	1.523	1.523	7.4	7.4
			Dieldrin (CLP2)	1.286	1.356	1.356	5.4	5.4
			4,4'-DDD (CLP1)	1.114	1.230	1.230	10.4	10.4
			4,4'-DDD (CLP2)	1.025	1.079	1.079	5.3	5.3

LDC # 60951B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	40.62	81	81	0
Tetrachloro-m- xylene	CLP2	50.0	43.57	87	87	0
Decachlorobiphenyl	CLP1	50.0	38.15	76	76	0
Decachlorobiphenyl	CLP2	50.0	47.93	96	96	0

LDC # 60951B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1941273-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	50.0	50.0	44.1	49.4	88	88	99	99	12	11
DDT	50.0	50.0	49.5	56.9	99	99	114	114	14	14

LDC # 60951B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	469600000	452800000	25.000	1.2940	10.00	15.06	1.00	0.817	16.3	16.3	0
	CLP1											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes/ 15	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	CS
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	Results <RL > MDL = J dets
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H13_0.2-2 +	L2435973-14		Soil	06/25/2024	Category B

Notes:

WG1991277-1 Blk		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			✓	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			✓	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			✓	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			✓	
Were the RT windows properly established?	✓			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	✓			
Was there contamination in the method blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	✓			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/12/2024	1260-1 (CLP1)	0.058	0.058	0.055	0.055	2.68	2.90
			1260-1 (CLP2)	0.048	0.048	0.049	0.049	4.36	4.46

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941617-3	07/01/24	1260-1 (CLP1)	0.055	0.051	0.051	7.3	7.3
			1260-1 (CLP2)	0.049	0.048	0.048	2.0	2.0

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1___

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	316.994	63	63	0
Tetrachloro-m- xylene	RTX-CLP2	500	353.657	71	71	0
Decachlorobiphenyl	RTX-CLP1	500	361.440	72	72	0
Decachlorobiphenyl	RTX-CLP2	500	388.323	78	78	0

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: __WG1941277-2,3 LCS/D__

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	303	297	232	246	77	77	83	83	8	6

Lab RPD based on %R

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
1	1260	6.654E+06	1.780E+08	250	0.049	5.00	10.38	1.00	0.79	**190.7**	190.7	0
	CLP2											
											Reported	
	1260-Total =	(190.7+101.569+221.858)						conc =	(171.38)(5mL)		**final conc**	
		3							(10.21g)(5mL)(0.849)			
	=	171.38						=	**20.9**		**21.0**	
	clean-up vol = 5 mL											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer: CL

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-06252024 (same SDG)
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	CS
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	ND	D = 1 / DUP-06252024 (same SDG)
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G15_0-0.2	L2435973-01		Soil	06/25/2024	Category B
2	H13_0.2-2	L2435973-14		Soil	06/25/2024	Category B

2,4-D, 2,4,5-T, 2,4,5-TP

Notes:

WG1941151-1 BLK		

Method: GC Herbicides (EPA SW 846 Method 8151A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?	✓			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?		✓		
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			✓	
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.188 std)	Recalculated CF (0.188 std)	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest22	04/12/24	2,4-D (STX-CLP1)	0.254	0.254	0.240	0.240	14.63	14.72
			2,4-D (STX-CLP2)	0.242	0.242	0.237	0.237	11.43	11.46

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	(Initial CF)	Reported CF (CCV)	Recalculated CF (CCV)	Reported % D	Recalculated %D
1	WG1620526-1	6/30/2024	2,4-D (STX-CLP1)	0.240	0.240	0.240	0	0.2
	Pest22		2,4-D (STX-CLP2)	0.237	0.243	0.243	2.5	2.5
2	WG1620526-1	7/1/2024	2,4-D (STX-CLP1)	0.240	0.244	0.243	1.7	1.8
	Pest22		2,4-D (STX-CLP2)	0.237	0.232	0.232	2.1	2.1

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
BB (1C)	0.500	0.503	101	101	0
BB (2C)	0.500	0.459	92	92	0

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DCAA)	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic acid	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1941151-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	163.0	163.0	142.0	144.0	87	87	89	88	2	1

LDC#: 60951B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (uL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	2,4-D	435900000	1044700000	0.250	0.2397	10000.00	30.66	1.00	NA	142.0	142.0	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2435973
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G15_0-0.2	L2435973-01	Metals, Wet Chemistry
H13_0.2-2	L2435973-14	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06252024
Field Duplicate pair: G15_0-0.2 and DUP_06252024

The above-listed soil samples were collected on June 25, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Chromium	0.046 mg/Kg	0.230 mg/Kg	G15_0-0.2
	Iron	0.613 mg/Kg	3.065 mg/Kg	H13_0.2-2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06252024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06252024	Chromium Sodium	0.00025 mg/L 0.0750 mg/L	0.00125 mg/Kg 0.375 mg/Kg	G15_0-0.2 H13_0.2-2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06252024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
H12_0-0.2MS (G15_0-0.2 H13_0.2-2)	Arsenic	156 (75-125)	J (all detects)
H12_0-0.2MS (G15_0-0.2 H13_0.2-2)	Nickel	72 (75-125)	J (all detects)

For H12_0-0.2MS, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Wet Chemistry

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

All criteria were met.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1941894-2/3 (H13_0.2-2)	Cyanide	42 (80-120)	55 (80-120)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

Samples G15_0-0.2 and DUP_06252024 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Metals

Analyte	Concentration (mg/Kg)		RPD
	G15_0-0.2	DUP_06252024	
Aluminum	10300	7890	26
Antimony	0.390	0.666	52
Arsenic	9.08	7.25	22
Barium	62.2	49.0	24
Beryllium	0.373	0.284	27
Cadmium	0.349	0.290	18
Calcium	2490	2160	14

Analyte	Concentration (mg/Kg)		RPD
	G15_0-0.2	DUP_06252024	
Chromium	24.2	16.9	36
Cobalt	5.51	3.39	48
Copper	16.3	13.2	21
Iron	13900	10600	27
Lead	28.5	23.3	20
Magnesium	3400	2650	25
Manganese	364	286	24
Mercury	1.27	1.07	17
Nickel	12.4	7.16	54
Potassium	749	622	19
Sodium	34.1	28.8	17
Vanadium	22.7	16.9	29
Zinc	55.4	40.5	31

Wet Chemistry

No results were detected in any of the samples.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
G15_0-0.2 H13_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06252024
VII	Matrix Spike/Matrix Spike Duplicate	SW	MS: (H12_0-0.2MS)
VIII	Laboratory Duplicate	A	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	SW	(1, DUP_06252024)
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G15_0-0.2 2X, 6010D, matrix	L2435973-01		Soil	06/25/2024	Category B
2	H13_0.2-2 2X, 6010D, matrix	L2435973-14		Soil	06/25/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1, 2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?	YES			
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Chromium	0.046		0.230					
Iron	0.613		3.065					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/25/24
Associated Samples: All samples

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06252024							
Cr	0.00025	0.00125						
Na	0.0750	0.375						

Comments: The action level, when applicable, is establised at 5X the highest concentration.
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METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
H12_0-0.2	Soil	Arsenic	156	75-125	All	Jdets/A	Det PDS = 116%
		Nickel	72	↓	↓	J/UJ/A	Det PDS = 74%

Comments: H12_0-0.2MS: Several analytes > 4X spike amount, %R

Method: Metals

Analyte	Concentration (mg/Kg)		RPD
	1	DUP_06252024	
Aluminum	10300	7890	26
Antimony	0.390	0.666	52
Arsenic	9.08	7.25	22
Barium	62.2	49.0	24
Beryllium	0.373	0.284	27
Cadmium	0.349	0.290	18
Calcium	2490	2160	14
Chromium	24.2	16.9	36
Cobalt	5.51	3.39	48
Copper	16.3	13.2	21
Iron	13900	10600	27
Lead	28.5	23.3	20
Magnesium	3400	2650	25
Manganese	364	286	24
Mercury	1.27	1.07	17
Nickel	12.4	7.16	54
Potassium	749	622	19
Sodium	34.1	28.8	17
Vanadium	22.7	16.9	29
Zinc	55.4	40.5	31

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1847903-3 ICV	ICP	Sb	0.5091	0.500	101.82	102	Y
R1847903-28 CCV	ICP	K	5.4117	5.0000	108.234	108	Y
R1847903-5 ICSA	ICP	Fe	172.7428	200	86.3714	86	Y
R1847908-1 ICV	CVAA	Hg	0.003172	0.00300	105.7333333	106	Y
R1847908-13 CCV	CVAA	Hg	0.010252	0.0100	102.52	103	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1940824-2	LCS	Hg	1.70016667	1.67	101.8063874	102	Y
WG1940822-2	LCS	As	9.856	9.60	102.6666667	103	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Hg (ug/L)	8.161	1	0.394	50	81.7	1.27	1.267637575	Y
2	Ni	0.0923	2	1.320	50	78.5	8.90	8.907546806	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951B
SDG #: L2435973
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025

Reviewer: NC
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A); Cyanide (EPA 9010C/9012B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06252024
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	SW	LCS/LCSD
IX	Field Duplicate	ND	(1, DUP_06252024)
X	Target Analyte Quantitation	A	
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G15_0-0.2	L2435973-01		Soil	06/25/2024	Category B
2	H13_0.2-2	L2435973-14		Soil	06/25/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
2	Cyanide
1, 2	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	Yes			
II/III Calibration				
Were all instruments calibrated at the required frequency?	Yes			
Were the proper number of standards used?	Yes			
Were all initial and continuing calibration verifications within the QC limits?	Yes			
Were all initial calibration correlation coefficients within limits as specifed by the method?	Yes			
Were balance checks performed as required?			NA	
IV Blanks				
Was a method blank associated with every sample in this SDG?	Yes			
Was there contamination in the method blanks?		No		
Was there contamination in the initial and continuing calibration blanks?		No		
V. Field Blanks				
Were field blanks identified in this SDG?	Yes			
Were target analytes detected in the field blanks?		No		
VI. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	

VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	Yes			
Were the LCS recoveries and RPDs (if applicable) within QC limits?		No		
IX. Field Duplicates				
Were field duplicates identifed in this SDG?	Yes			
Were target analytes detected in the field duplicates?		No		
X. Sample Result Verification				
Were all reporting limits adjusted to reflect sample dilutions?	Yes			
Were all soil samples dry weight corrected?	Yes			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	Yes			

METHOD: Inorganics

A LCS/LCSD was analzyed for each matrix at the required frequencies. All LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

LCS/LCSD ID	Matrix	Analyte	LCS %R	LCSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
WG1941894-2/3	Soil	Cyanide	42	55	80-120			2	J/UJ/A	ND

Comments:

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cyanide were recalculated.
Calibration date: 7/2/2024
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Height	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cyanide	s1	25	0.90629	0.999993	0.99999	Y
		s2	10	0.35909			
		s3	5	0.17915			
		s4	2	0.07088			
		s5	1	0.03446			
		s6	0.5	0.01687			
		s7	0.2	0.00754			
		s8	0	-0.0016			
		s9					
		s10					
		s11					
		s12					

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.203	0.2		101.5	101	Y
Calibration verification	Cyanide	0.09916	0.10000		99.16	99	Y
Calibration verification	Cr(VI)	0.205	0.2		102.5	103	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1941894-2	LCS	Cyanide	31.7574	76	41.78605263	42	Y
WG1942120-2	LCS	Cr(VI)	194.201313	192	101.1465172	101	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/Kg)	Recalculated Result (mg/Kg)	Acceptable (Y/N)
1	Cr(VI)	0.000	1	2.5892	100	81.7	0.196U	0	Y
2	Cyanide	0.16872	1	1.0113	50	78.5	0.27U	0.214929936	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2436258
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C10_2-4	L2436258-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 14, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
C10_2-4	trans-Chlordane	200.0	NJ (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951C
SDG #: L2436258
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r^2 ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes / IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C10_2-4	L2436258-01		Soil	06/14/2024	Category B

Notes:

WG1939887-1 BLANK		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	✓			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	✓			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were the RT windows properly established?	✓			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	✓			
Was there contamination in the method blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951C

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	trans-Chlordane	200	NJ/P

Comments: Reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL

LDC# 60951C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDD (CLP1)	1.056	1.056	1.101	1.101	14.71	14.69
			4,4'-DDD (CLP2)	0.993	0.993	0.996	0.996	8.01	8.00

LDC# 60951C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940414-1 PEST15	06/27/24	Dieldrin (CLP1)	1.322	1.286	1.286	2.7	2.7
			Dieldrin (CLP2)	1.156	1.276	1.276	10.4	10.4
			4,4'-DDD (CLP1)	1.101	1.046	1.046	5.0	5.0
			4,4'-DDD (CLP1)	0.996	1.053	1.053	5.7	5.7

LDC # 60951C

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	32.66	65	65	0
Tetrachloro-m- xylene	CLP2	50.0	37.14	74	74	0
Decachlorobiphenyl	CLP1	50.0	34.68	69	69	0
Decachlorobiphenyl	CLP2	50.0	42.36	85	85	0

LDC # 60951C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1939887-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	50.0	50.0	32.8	41.0	66	66	82	82	22	22
DDT	50.0	50.0	36.3	43.6	73	73	87	87	19	18

LDC # 60951C

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	7560051	86241682	25.000	1.3220	10.00	15.96	1.00	0.860	1.2	1.2	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436258
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C10_2-4	L2436258-01	Metals
C10_2-4MS	L2436258-01MS	Metals
C10_2-4DUP	L2436258-01DUP	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 14, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.571 mg/Kg	2.855 mg/Kg	C10_2-4
ICB/CCB	Sodium	1.448 mg/L	7.240 mg/Kg	C10_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Matrix spike (MS) sample analysis was performed on an associated project sample. For C10_2-4MS, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Laboratory Duplicate Results

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (≤20)	Difference (≤3.60)	Validation Action
C10_2-4DUP (C10_2-4)	Cobalt	-	4.06	J (all detects)
	Manganese	41	-	J (all detects)
	Potassium	21	-	J (all detects)

Serial Dilution

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
C10_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951C
SDG #: L2436258
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	SW	MS (2): Several analytes > 4X spike amount, %R
VIII	Laboratory Duplicate	SW	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C10_2-4 2X, 6010D, matrix	L2436258-01		Soil	06/14/2024	Category B
2	C10_2-4MS	L2436258-01MS	MS	Soil	06/14/2024	Category B
3	C10_2-4DUP	L2436258-01DUP	DUP	Soil	06/14/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg
QC			
2, 3	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.571		2.855					
Na		1.448	7.240					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Laboratory duplicate analysis was performed by the laboratory. All laboratory duplicates were with the relative percent difference (RPD) for samples >5X the reporting limits with the exceptions listed below. If samples were <5X the reporting limits, the difference was within 1X the reporting limit for water samples and within 2X the reporting limit for soil samples for all samples with the exceptions listed below.

Duplicate ID	Matrix	Analyte	RPD	RPD Limit	Difference (mg/Kg)	Difference Limit (2X RL)	Associated Samples	Qualification	Det/ND
3	Soil	Cobalt			4.06	3.60	All	J/UJ/A	Det
		Manganese	41	20			↓	↓	↓
		Potassium	21	↓			↓	↓	↓

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1846583-1 ICV	ICP	Ba	0.5070	0.500	101.4	101	Y
R1846583-6 CCV	ICP	Mg	0.4870	0.5000	97.4	97	Y
R1846583-3 ICSA	ICP	Al	513.2380	500	102.6476	103	Y
R1846507-1 ICV	CVAA	Hg	0.002851	0.00300	95.03333333	95	Y
R1846507-19 CCV	CVAA	Hg	0.0100	0.0100	100.44	100	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1939870-2	LCS	Hg	1.61683333	1.7	96.35478725	97	Y
2	MS	Hg	1.603644	1.59	100.8581296	101	Y
3	Duplicate	Zn	41.8280277	40.548681	3.106088408	3	Y
1	Serial dilution	Cr	23.7501933	26.5189516	11.6578348	12	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	V	0.3839	2	1.292	50	86.1	34.50	34.510595	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436281
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 10, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H8_0.2-2	L2436281-02	VOC, SVOC, Pesticide, PCB, Herbicide
H5_0-0.2	L2436281-13	Pesticide, Herbicide
H8_0.2-2MS	L2436281-02MS	VOC, SVOC, Pesticide, PCB, Herbicide
H8_0.2-2MSD	L2436281-02MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06262024, FB_06262024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 26, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers with the exception listed below.

The VOC nondetect results for vinyl acetate in sample H8_0.2-2 was rejected (R) due to severely low MS/MSD percent recoveries. The results are not usable for project objectives, which may have a major impact on the data usability.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
05/15/24	ICAL VOA110	1,4-Dioxane	0.003	H8_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/16/24	V10240515N18	Carbon disulfide	33.9	H8_0.2-2	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/28/24	V10240628A01.D	Bromomethane	26.7	H8_0.2-2	UJ (all non-detects)
		Methylene chloride	20.5		UJ (all non-detects)
		Hexachlorobutadiene	24.3		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/28/24	V10240628A01.D	1,4-Dioxane	0.00301	H8_0.2-2	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/02/24	ABN0702	Bis(2-chloroisopropyl)ether	27.9	H8_0.2-2	UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/02/24	WG1942267-1	CLP1	Methoxychlor	21.7	H8_0.2-2 H5_0-0.2	UJ (all non-detects)
07/02/24	WG1942267-3	CLP1	Toxaphene	68.6	H8_0.2-2 H5_0-0.2	UJ (all non-detects)
07/02/24	WG1942267-3	CLP2	Toxaphene	39.7	H8_0.2-2 H5_0-0.2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte TIC (RT in minutes)	Level Detected	Action Level	Associated Samples
WG1941682-5BLANK	Chloroform	0.7 ug/Kg	RL	H8_0.2-2
	Bromomethane	1.6 ug/Kg	RL	
	Unknown (1.56)	8.95 ug/Kg	RL	
	Unknown (2.50)	4.36 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
H8_0.2-2	Unknown (1.56)	17.6	17.6U

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

No positive results were found in the trip blank sample TB_06262024 for VOC analysis.

Pesticide, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06262024 for pesticide and herbicide analyses.

SVOC, PCB

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
H8_0.2-2MS/MSD (H8_0.2-2)	Methylene chloride	57 (70-130)	55 (70-130)	UJ (all non-detects)
	Dibromochloromethane	68 (70-130)	-	UJ (all non-detects)
	Tetrachloroethene	-	69 (70-130)	UJ (all non-detects)
	Chlorobenzene	69 (70-130)	62 (70-130)	UJ (all non-detects)
	Bromoform	56 (70-130)	59 (70-130)	UJ (all non-detects)
	1,1,2,2-Tetrachloroethane	69 (70-130)	-	UJ (all non-detects)
	trans-1,2-Dichloroethene	-	67 (70-130)	UJ (all non-detects)
	1,2-Dichlorobenzene	45 (70-130)	40 (70-130)	UJ (all non-detects)
	1,3-Dichlorobenzene	48 (70-130)	40 (70-130)	UJ (all non-detects)
	1,4-Dichlorobenzene	45 (70-130)	38 (70-130)	UJ (all non-detects)
	m,p-Xylene	-	62 (70-130)	UJ (all non-detects)
	o-Xylene	-	62 (70-130)	UJ (all non-detects)
	Styrene	64 (70-130)	56 (70-130)	UJ (all non-detects)
	1,2-Dibromoethane	69 (70-130)	-	UJ (all non-detects)
	Bromobenzene	55 (70-130)	50 (70-130)	UJ (all non-detects)
	n-Butylbenzene	-	40 (70-130)	UJ (all non-detects)
	sec-Butylbenzene	-	53 (70-130)	UJ (all non-detects)
	tert-Butylbenzene	-	57 (70-130)	UJ (all non-detects)
	2-Chlorotoluene	-	56 (70-130)	UJ (all non-detects)
	4-Chlorotoluene	64 (70-130)	50 (70-130)	UJ (all non-detects)
	1,2-Dibromo-3-chloropropane	48 (68-130)	52 (68-130)	UJ (all non-detects)
	Hexachlorobutadiene	52 (67-130)	25 (67-130)	UJ (all non-detects)
	Isopropylbenzene	-	67 (70-130)	UJ (all non-detects)
	p-Isopropyltoluene	-	45 (70-130)	UJ (all non-detects)
	Naphthalene	26 (70-130)	31 (70-130)	UJ (all non-detects)
	n-Propylbenzene	-	58 (70-130)	UJ (all non-detects)
	1,2,3-Trichlorobenzene	24 (70-130)	24 (70-130)	UJ (all non-detects)
	1,2,4-Trichlorobenzene	26 (70-130)	24 (70-130)	UJ (all non-detects)
	1,3,5-Trimethylbenzene	-	53 (70-130)	UJ (all non-detects)
	1,2,4-Trimethylbenzene	68 (70-130)	49 (70-130)	UJ (all non-detects)
	p-Diethylbenzene	67 (70-130)	38 (70-130)	UJ (all non-detects)
	4-Ethyltoluene	-	52 (70-130)	UJ (all non-detects)
	1,2,4,5-Tetramethylbenzene	50 (70-130)	34 (70-130)	UJ (all non-detects)
	Ethyl ether	58 (67-130)	57 (67-130)	UJ (all non-detects)
	trans-1,4-Dichloro-2-butene	63 (70-130)	-	UJ (all non-detects)
H8_0.2-2MS/MSD (H8_0.2-2)	Vinyl acetate	0 (70-130)	0 (70-130)	R (all non-detects)

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
H8_0.2-2MS/MSD (H8_0.2-2)	n-Butylbenzene	64	None
	sec-Butylbenzene	52	
	tert-Butylbenzene	43	
	Hexachlorobutadiene	73	
	Isopropylbenzene	35	
	p-Isopropyltoluene	55	
	n-Propylbenzene	43	
	1,3,5-Trimethylbenzene	40	
	1,2,4-Trimethylbenzene	37	
	p-Diethylbenzene	59	
	4-Ethyltoluene	53	
	1,2,4,5-Tetramethylbenzene	40	

No data were qualified due to high RPDs when the associated results were non-detected.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (30-150)	MSD %R (30-150)	Validation Action
H8_0.2-2MS/MSD (H8_0.2-2)	4,4'-DDE	-	20	J (all detects)

Relative percent differences (RPD) were within QC limits.

SVOC, PCB, Herbicide

All criteria were met.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC, SVOC, and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the PCB and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
H8_0.2-2	Heptachlor epoxide cis-Chlordane	67.7 97	J (all detects) J (all detects)
H5_0-0.2	cis-Chlordane trans-Chlordane	94 43	J (all detects) J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW / SW	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB-06262024 (Same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2	L2436281-02		Soil	06/26/2024	Category B
2	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
3	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B

Notes:

WG1941682-5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 30%?		√		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?	√			
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl chloride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2. 1-Methylnaphthalene
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2. 3,3-Dimethyl-1-butanol
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2. Bromoethane
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2. Hexachloroethane
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2. Isobutanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2. Cyclohexanone
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/15/2024	ICAL VOA110	1,4-Dioxane		0.003 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤30%)	Associated samples	Qualifications
	5/16/2024	V10240515N18	Carbon disulfide	33.9	ALL (ND)	J/UJ/A

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/28/2024	V10240628A01.D	Bromomethane	26.7		All (ND)	J/UJ/A
			Methylene chloride	20.5			
			Hexachlorobutadiene	24.3			
			1,4-Dioxane		0.00301 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: ____06/28/24_____ **Associated samples:**_____All_____
Conc. units: __ug/Kg_____

Compound	Blank ID		Sample Identification						
	WG1941682-5BLANK		1						
Chloroform	0.7								
Bromomethane	1.6								
TICs	RT (min)	Conc	RT (min)	Conc					
Unknown	1.56	8.95	1.56	17.6/U					
Unknown	2.50	4.36							

Blank analysis date: _____ **Associated samples:**_____
Conc. units: _____

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	see attached						1 (ND) (%R)	J/UJ/A, J/R/A
							(RPD)	J det/A

2/3

P. 1 of 4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2436281
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: H8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2436281-02	Analysis Date	: 06/28/24 12:53
Matrix Spike	: WG1941682-6	MS Analysis Date	: 07/01/24 03:35
Matrix Spike Dup	: WG1941682-7	MSD Analysis Date	: 07/01/24 04:02

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
Methylene chloride E	ND	190	110	57	Q	183	100	55	Q	8	70-130	30
1,1-Dichloroethane	ND	190	200	103		183	180	99		8	70-130	30
Chloroform	ND	190	180	94		183	170	90		8	70-130	30
Carbon tetrachloride	ND	190	200	104		183	180	96		12	70-130	30
1,2-Dichloropropane	ND	190	170	91		183	160	87		8	70-130	30
Dibromochloromethane T	ND	190	130	68	Q	183	130	70		1	70-130	30
1,1,2-Trichloroethane	ND	190	150	80		183	150	80		4	70-130	30
Tetrachloroethene AA	ND	190	170	87		183	130	69	Q	27	70-130	30
Chlorobenzene DD	ND	190	130	69	Q	183	110	62	Q	15	70-130	30
Trichlorofluoromethane	ND	190	150	77		183	140	74		9	70-139	30
1,2-Dichloroethane	ND	190	160	85		183	160	85		4	70-130	30
1,1,1-Trichloroethane	ND	190	210	110		183	190	104		10	70-130	30
Bromodichloromethane	ND	190	150	81		183	150	81		4	70-130	30
trans-1,3-Dichloropropene	ND	190	150	77		183	140	78		2	70-130	30
cis-1,3-Dichloropropene	ND	190	150	78		183	140	78		5	70-130	30
1,1-Dichloropropene	ND	190	200	106		183	180	96		14	70-130	30
Bromoform X	ND	190	110	56	Q	183	110	59	Q	2	70-130	30
1,1,2,2-Tetrachloroethane BB	ND	190	130	69	Q	183	140	74		3	70-130	30
Benzene	ND	190	190	97		183	170	92		9	70-130	30
Toluene	1.5J	190	170	89		183	150	80		15	70-130	30
Ethylbenzene	ND	190	170	89		183	130	70		27	70-130	30
Chloromethane	ND	190	200	103		183	190	102		6	52-130	30

%R J/UJ/A

2/3

p. 2 of 4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2436281
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: H8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2436281-02	Analysis Date	: 06/28/24 12:53
Matrix Spike	: WG1941682-6	MS Analysis Date	: 07/01/24 03:35
Matrix Spike Dup	: WG1941682-7	MSD Analysis Date	: 07/01/24 04:02

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit 2R
Bromomethane	ND	190	120	64		183	120	64		3	57-147	30
Vinyl chloride	ND	190	180	96		183	170	92		7	67-130	30
Chloroethane	ND	190	150	77		183	140	75		6	50-151	30
1,1-Dichloroethene	ND	190	140	71		183	120	68		9	65-135	30
trans-1,2-Dichloroethene PPP	ND	190	130	70		183	120	67	Q	9	70-130	30 J/UJ/A
Trichloroethene	ND	190	180	93		183	150	83		15	70-130	30
1,2-Dichlorobenzene JJJ	ND	190	85	45	Q	183	73	40	Q	15	70-130	30
1,3-Dichlorobenzene FFF	ND	190	92	48	Q	183	74	40	Q	21	70-130	30
1,4-Dichlorobenzene HHH	ND	190	85	45	Q	183	69	38	Q	20	70-130	30
Methyl tert butyl ether	ND	190	140	71		183	130	71		4	66-130	30
p/m-Xylene RRR	ND	381	300	80		366	230	62	Q	29	70-130	30
o-Xylene SSS	ND	381	290	76		366	230	62	Q	25	70-130	30
cis-1,2-Dichloroethene	ND	190	170	87		183	160	86		6	70-130	30
Dibromomethane	ND	190	140	75		183	140	76		2	70-130	30
Styrene FF	ND	381	240	64	Q	366	200	56	Q	17	70-130	30
Dichlorodifluoromethane	ND	190	190	101		183	180	96		9	30-146	30
Acetone	ND	190	110	55		183	99	54		6	54-140	30
Carbon disulfide	ND	190	130	70		183	120	66		11	59-130	30
2-Butanone	ND	190	140	74		183	140	76		0	70-130	30
Vinyl acetate HH	ND	190	ND	0	Q	183	ND	0	Q	NC	70-130	30 J/R/A
4-Methyl-2-pentanone	ND	190	150	80		183	150	81		3	70-130	30
1,2,3-Trichloropropane	ND	190	140	71		183	130	71		4	68-130	30

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2436281
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: H8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2436281-02	Analysis Date	: 06/28/24 12:53
Matrix Spike	: WG1941682-6	MS Analysis Date	: 07/01/24 03:35
Matrix Spike Dup	: WG1941682-7	MSD Analysis Date	: 07/01/24 04:02

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit 2R
2-Hexanone	ND	190	140	71		183	140	75		1	70-130	30
Bromochloromethane	ND	190	140	75		183	140	75		4	70-130	30
2,2-Dichloropropane	ND	190	220	113		183	190	105		11	70-130	30
1,2-Dibromoethane TT	ND	190	130	69	Q	183	130	72		0	70-130	30 J/MS/A
1,3-Dichloropropane	ND	190	150	81		183	150	82		3	69-130	30
1,1,1,2-Tetrachloroethane	ND	190	150	76		183	130	71		11	70-130	30
Bromobenzene WW	ND	190	100	55	Q	183	92	50	Q	12	70-130	30
n-Butylbenzene III	ND	190	140	74		183	73	40	Q	64 Q	70-130	30
sec-Butylbenzene EEE	ND	190	160	86		183	97	53	Q	52 Q	70-130	30
tert-Butylbenzene CCC	ND	190	160	85		183	110	57	Q	43 Q	70-130	30
o-Chlorotoluene ZZ	ND	190	140	72		183	100	56	Q	30	70-130	30
p-Chlorotoluene BBB	ND	190	120	64	Q	183	91	50	Q	28	70-130	30
1,2-Dibromo-3-chloropropane MM	ND	190	92	48	Q	183	95	52	Q	3	68-130	30
Hexachlorobutadiene LLL	ND	190	99	52	Q	183	46	25	Q	73 Q	67-130	30
Isopropylbenzene VV	ND	190	170	91		183	120	67	Q	35 Q	70-130	30
p-Isopropyltoluene GGG	ND	190	140	76		183	82	45	Q	55 Q	70-130	30
Naphthalene MMM	ND	190	49	26	Q	183	56	31	Q	14	70-130	30
Acrylonitrile	ND	190	140	71		183	140	74		0	70-130	30
n-Propylbenzene YY	ND	190	160	86		183	110	58	Q	43 Q	70-130	30
1,2,3-Trichlorobenzene NNN	ND	190	45	24	Q	183	44	24	Q	4	70-130	30
1,2,4-Trichlorobenzene KKK	ND	190	50	26	Q	183	44	24	Q	13	70-130	30
1,3,5-Trimethylbenzene AAA	ND	190	150	76		183	97	53	Q	40 Q	70-130	30

RPJ

Jdets

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Roux Env. Eng. & Geology, DPC	Lab Number	: L2436281
Project Name	: ELMWOOD PRESERVE	Project Number	: 3858.0004Y000
Client Sample ID	: H8_0.2-2	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2436281-02	Analysis Date	: 06/28/24 12:53
Matrix Spike	: WG1941682-6	MS Analysis Date	: 07/01/24 03:35
Matrix Spike Dup	: WG1941682-7	MSD Analysis Date	: 07/01/24 04:02

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
1,2,4-Trimethylbenzene DDD	ND	190	130	68	Q	183	90	49	Q	37 Q	70-130	30
1,4-Dioxane	ND	9530	7100	74		9160	7400	80		3	65-136	30
p-Diethylbenzene ZZ	ND	190	130	67	Q	183	70	38	Q	59 Q	70-130	30
p-Ethyltoluene VVV	ND	190	150	78		183	95	52	Q	43 Q	70-130	30
1,2,4,5-Tetramethylbenzene AZ	ND	190	94	50	Q	183	63	34	Q	40 Q	70-130	30
Ethyl ether LLLL	ND	190	110	58	Q	183	110	57	Q	5	67-130	30
trans-1,4-Dichloro-2-butene YYYY	ND	190	120	63	Q	183	130	70		7	70-130	30

2R RP

J/MJ/A Jdel

LDC #: 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 20 std)	Recalculated RRF (RRF 20 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA110	05/15/24	Trichloroethene (FBZ)	0.235	0.235	0.233	0.233	9.90	9.94
			Toluene (CBZ)	0.688	0.688	0.719	0.719	7.85	7.83
			Naphthalene (DCB)	2.334	2.334	2.401	2.401	5.09	5.08

LDC #: 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V10240628A01.D	06/28/24	Trichloroethene (FBZ)	0.233	0.201	0.201	13.7	13.7
			Toluene (CBZ)	0.719	0.626	0.626	12.9	12.9
			Naphthalene (DCB)	2.401	2.268	2.268	5.5	5.5

LDC# 60951D

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.69	98	98	0
1,2-Dichloroethane-d4	20.0	23.69	118	118	0
Toluene-d8	20.0	20.05	100	100	0
4-Bromofluorobenzene	20.0	20.51	103	103	0

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3___

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	100.0	100.0	0	71.6	67.6	71	72	68	68	9	6
Benzene	100.0	100.0	0	97.2	92.1	97	97	92	92	9	5
Trichloroethene	100.0	100.0	0	93.1	83.0	93	93	83	83	15	11
Toluene	100.0	100.0	1.5	88.5	79.6	89	87	80	78	15	11
Chlorobenzene	100.0	100.0	0	69.6	62.2	69	70	62	62	15	11

LDC# 60951D

VALIDATION FINDINGS WORKSHEET

LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 * SSC/SA

Where:

SSC = Spiked concentration

SA = Spike added

LCS = Laboratory control spike recovery

LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1941682-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	33.777	34.933	84	84	87	87	4	3
Benzene	40.00	40.00	34.729	39.776	87	87	99	99	13	14
Trichloroethene	40.00	40.00	34.422	40.938	86	86	102	102	17	17
Toluene	40.00	40.00	34.847	39.567	87	87	99	99	13	13
Chlorobenzene	40.00	40.00	35.010	39.483	88	88	99	99	12	12

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Toluene	3805	121823	20.0	0.719	1.0	5.00	4.50	0.656	1.47	1.5	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1 of 1
Reviewer: DVC
2nd Reviewer: CF

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD≤20% or ICV≤30%
IV	Continuing Calibration	SW	CCV≤20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results <RL >MDL • J dcts
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2	L2436281-02		Soil	06/26/2024	Category B
2	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
3	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B

Notes:

WG1941975-1 Blk		

VALIDATION FINDINGS CHECKLIST

Method: SVOA (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤ 20%)	RRF (Limits)	Associated samples	Qualifications
	7/2/2024	ABN0702	Bis(2-chloroisopropyl)ether	27.9		ALL (ND)	J/UJ/A

DOD
%D 20%/50%

NFG
Method criteria

RRF: 0.05

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL SV103	12/17/2023	Phenol (DCB)	1.642	1.642	1.654	1.654	2.74	2.73
			Naphthalene (NPT)	1.017	1.017	1.031	1.031	2.34	2.35
			Diethylphthalate (ANT)	1.502	1.502	1.487	1.487	2.97	2.97
			Fluoranthene (PHN)	1.192	1.192	1.194	1.194	1.76	1.76
			Chrysene (CRY)	1.227	1.227	1.246	1.247	5.29	5.30
			Benzo(g,h,i)perylene (PRY)	1.006	1.006	0.990	0.990	4.02	4.03

LDC#: 60951D

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0702	07/02/24	Phenol (DCB)	1.654	1.512	1.512	8.6	8.6
			Naphthalene (NPT)	1.031	0.945	0.945	8.3	8.3
	SV103		Diethylphthalate (ANT)	1.487	1.282	1.282	13.8	13.8
			Pyrene (PHN)	1.194	1.030	1.030	13.7	13.7
			Chrysene (CRY)	1.246	1.159	1.159	7.0	7.0
			Benzo(g,h,i)perylene (PRY)	0.990	0.921	0.921	7.0	7.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	20.543	82	82	0
2-Fluorobiphenyl	25.000	16.655	67	67	0
Terphenyl-d14	25.000	14.646	59	59	0
Phenol-d5	50.000	38.856	78	78	0
2-Fluorophenol	50.000	38.189	76	76	0
2,4,6-Tribromophenol	50.000	31.059	62	62	0

LDC # 60951D

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration
MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

MS/MSD ID:___2/3_____

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1990	2000	0	1467	1484	75	74	75	74	1	1
N-Nitroso-di-n-propylamine	1990	2000	0	1597	1654	80	80	80	83	0	4
4-Chloro-3-methylphenol	1990	2000	0	1532	1516	75	77	75	76	0	1
Acenaphthene	1990	2000	0	1356	1333	70	68	65	67	7	2
Pentachlorophenol	1990	2000	0	1306	1307	65	66	65	65	0	0
Pyrene	1990	2000	35	1352	1327	70	66	65	65	7	2

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1941278-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	34.294	38.052	86	86	95	95	10	10
N-Nitroso-di-n-propylamine	40.0	40.0	34.110	38.551	85	85	96	96	12	12
4-Chloro-3-methylphenol	40.0	40.0	33.958	37.242	85	85	93	93	9	9
Acenaphthene	40.0	40.0	31.913	36.111	80	80	90	90	12	12
Pentachlorophenol	40.0	40.0	23.576	23.544	59	59	59	59	0	0
Pyrene	40.0	40.0	34.037	38.196	85	85	95	95	11	12

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Fluoranthene	11299	474361	40.0	1.194	1.00	1000.0	30.96	0.656	39.3	39.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: AVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_06262024 (Same SDG)
VII	Surrogate Spikes /15	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results <RL >MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2	L2436281-02		Soil	06/26/2024	Category B
2	H5_0-0.2	L2436281-13		Soil	06/26/2024	Category B
3	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
4	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B

Notes:

WG1941693-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/2/2024	WG1942267-1	CLP1	Methoxychlor	21.7	ALL (-BLK) (ND)	J/UJ/A
		WG1942267-3	CLP1	Toxaphene	68.6	↓	↓
		↓	CLP2	Toxaphene	39.7	↓	↓

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	4,4'-DDE	-	20	30-150			1 (DET)	J/UJ/A

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Heptachlor Epoxide	67.7	J det/A
		cis-Chlordane	97	
	2	cis-Chlordane	94	
		trans-Chlordane	43.~~000~~	✓

Comments:_____

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942267-1	07/02/24	Dieldrin (CLP1)	1.268	1.450	1.450	14.4	14.4
			Dieldrin (CLP2)	1.203	1.255	1.255	4.3	4.3
			4,4'-DDT (CLP1)	1.112	1.231	1.231	10.7	10.7
			4,4'-DDT (CLP2)	1.087	1.043	1.043	4.0	4.0

LDC # 60951D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	31.94	64	64	0
Tetrachloro-m- xylene	CLP2	50.0	33.36	67	67	0
Decachlorobiphenyl	CLP1	50.0	39.95	80	80	0
Decachlorobiphenyl	CLP2	50.0	49.53	99	99	0

LDC # 60951D

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: L1793859-05 MS/MSD

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	50.5	50.7	0	36.3	33.7	72	72	66	66	7	7
DDT	50.5	50.7	36.7	82.2	68.8	90	90	63	63	18	18

LDC # 60951D

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1939887-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.7	32.1	26.6	22.6	84	84	70	70	18	16
DDT	31.7	32.1	28.5	25.0	90	90	78	78	14	13

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDT	73270263	44217027	25.000	1.1120	10.00	15.49	1.00	0.656	36.6	36.7	0
	CLP1											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: CF

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤ 20% ICV≤ 20%
III	Continuing Calibration	A	CCV≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes/IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2	L2436281-02		Soil	06/26/2024	Category B
2	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
3	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B

Notes:

WG1941901-1 Blk		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (1000 std)	Recalculated CF (1000 std)	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST23	8/25/2023	1260-3 (CLP1)	0.064	0.064	0.062	0.062	15.45	15.27
			1260-3 (CLP2)	0.056	0.056	0.055	0.055	12.62	12.78

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	(Initial CF)	Reported CF (CCV)	Recalculated CF (CCV)	Reported % D	Recalculated %D
1	WG1862891-1	07/02/24	1260-3 (CLP1)	0.062	0.052	0.052	16.1	16.1
			1260-3 (CLP2)	0.055	0.049	0.049	10.9	10.9

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG__

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	320.320	64	64	0
Tetrachloro-m- xylene	RTX-CLP2	500	346.181	69	69	0
Decachlorobiphenyl	RTX-CLP1	500	336.400	67	67	0
Decachlorobiphenyl	RTX-CLP2	500	374.919	75	75	0

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	459	453	0	314	321	68	68	71	71	2	2

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: __WG1941901-2,3 LCS/D__

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	301	293	232	230	77	77	79	78	3	1

Lab RPD based on %R

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
LCS	1260-3	5.395E+08	9.080E+08	250	0.062	5.00	10.39	1.00	NA	**2395.82**	2395.73	0
	CLP1											
											Reported	
	1260-Total =	(2374.863+2373.821+2395.733+2435.427+2502.512)						conc =	(2416.47)(5mL)		**final conc**	
			5						(10.39g)(5mL)			
	=	2416.47						=	**232.6**		**232.0**	
	clean-up vol = 5 mL											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06262024 (same SDG)
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2	L2436281-02		Soil	06/26/2024	Category B
2	H5_0-0.2	L2436281-13		Soil	06/26/2024	Category B
3	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
4	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B

Notes:

WG 1941795-1 Blk		

Method: GC Herbicides (EPA SW 846 Method 8151A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
V. Field Blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	4/12/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1935104-2 PEST16	07/02/24	2,4-D (CLP1)	0.132	0.130	0.130	1.5	1.5
			2,4-D (CLP2)	0.217	0.225	0.225	7.8	3.7

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	248	249	0	209	231	84	84	93	93	10	10

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1941795-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	166.0	164.0	124.0	138.0	75	75	84	84	11	11

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (uL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	2,4-D	188500000	950300000	0.250	0.1324	10000	30.11	1.00	NA	124.4	124.0	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436281
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H8_0.2-2	L2436281-02	Metals, Wet Chemistry
H5_0-0.2	L2436281-13	Metals, Wet Chemistry
H8_0.2-2MS	L2436281-02MS	Metals, Wet Chemistry
H8_0.2-2MSD	L2436281-02MSD	Metals, Wet Chemistry
H8_0.2-2DUP	L2436281-02DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks:	FB_06262024
Field Duplicate pair:	None Associated

The above-listed soil samples were collected on June 26, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.85 mg/Kg	4.250 mg/Kg	H8_0.2-2
ICB/CCB	Antimony	0.276 mg/L	1.380 mg/Kg	H8_0.2-2
PB (prep blank)	Iron	0.85 mg/Kg	4.250 mg/Kg	H5_0-0.2
ICB/CCB	Antimony	0.1692 mg/L	0.846 mg/Kg	H5_0-0.2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
H5_0-0.2	Antimony	0.619 mg/Kg	4.30U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

Contamination was detected in the field blank sample FB_06262024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06262024	Barium	0.00018 mg/L	0.0009 mg/Kg	H8_0.2-2 H5_0-0.2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06262024 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
H8_0.2-2MS/MSD (H8_0.2-2 H5_0-0.2)	Arsenic	-	158 (75-125)	J (all detects)
	Lead	-	149 (75-125)	J (all detects)

For H8_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
H8_0.2-2MS/MSD (H8_0.2-2 H5_0-0.2)	Arsenic	21 (≤20)	J (all detects)
	Lead	23 (≤20)	J (all detects)

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

All criteria were met.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
H8_0.2-2 H5_0-0.2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06262024
VII	Matrix Spike/Matrix Spike Duplicate	SW	MS/MSD (3, 4): Several analytes > 4X spike amount
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2 2X, 6010D, matrix	L2436281-02		Soil	06/26/2024	Category B
2	H5_0-0.2 2X, 6010D, matrix	L2436281-13		Soil	06/26/2024	Category B
3	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
4	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1, 2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg
QC			
3, 4	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.85		4.250					
Antimony		0.276	1.380					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 2

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	2				
Iron	0.85		4.250					
Antimony		0.1692	0.846	0.619/4.30U				

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/26/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06262024							
Ba	0.00018	0.0009						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3, 4	Soil	Arsenic		158	75-125			All	Jdets/A	Det PDS = 110%
		Lead		149	↓			↓	↓	Det PDS = 107%
3, 4	Soil	Arsenic				21	20	All	J/UJ/A	Det
		Lead				23	↓	↓	↓	Det

Comments: MS/MSD (3, 4): Several analytes > 4X spike amount, %R

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1848486-3 ICV	ICP	Se	0.4973	0.500	99.46	99	Y
R1848486-20 CCV	ICP	Cu	0.5179	0.5000	103.58	104	Y
R1848486-5 ICSA	ICP	Ca	474.6835	500	94.9367	95	Y
R1848914-1 ICV	CVAA	Hg	0.003138	0.00300	104.6	105	Y
R1848914-7 CCV	CVAA	Hg	0.009956	0.0100	99.56	100	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1941919-2	LCS	Hg	1.6805	1.7	100.6287425	101	Y
3	MS	Ag	6.39	5.93	107.8268862	108	Y
3, 4	MS/MSD RPD	Hg	2.26747681	2.0851753	8.376571589	9	Y
1	PDS	Pb	34.3680709	31.9	107.7368994	107	Y
1	Serial dilution	Al	18329.6901	18387.4	0.314843839	1	Y

Sample Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Al	152.1071	2	1.265	50	65.6	18300	18329.69006	Y
2	Hg (ug/L)	4.036	1	0.361	50	88.4	0.63	0.632356075	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951D
SDG #: L2436281
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB _06262024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H8_0.2-2	L2436281-02		Soil	06/26/2024	Category B
2	H5_0-0.2	L2436281-13		Soil	06/26/2024	Category B
3	H8_0.2-2MS	L2436281-02MS	MS	Soil	06/26/2024	Category B
4	H8_0.2-2MSD	L2436281-02MSD	MSD	Soil	06/26/2024	Category B
5	H8_0.2-2DUP	L2436281-02DUP	DUP	Soil	06/26/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Cyanide
1, 2	Cr(VI)
QC	
3, 4	Cr(VI), Cyanide
5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	Yes			
II/III Calibration				
Were all instruments calibrated at the required frequency?	Yes			
Were the proper number of standards used?	Yes			
Were all initial and continuing calibration verifications within the QC limits?	Yes			
Were all initial calibration correlation coefficients within limits as specifed by the method?	Yes			
Were balance checks performed as required?			NA	
IV Blanks				
Was a method blank associated with every sample in this SDG?	Yes			
Was there contamination in the method blanks?		No		
Was there contamination in the initial and continuing calibration blanks?		No		
V. Field Blanks				
Were field blanks identified in this SDG?	Yes			
Were target analytes detected in the field blanks?		No		
VI. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	Yes			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	Yes			

VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	Yes			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	Yes			
IX. Field Duplicates				
Were field duplicates identifed in this SDG?		No		
Were target analytes detected in the field duplicates?			NA	
X. Sample Result Verification				
Were all reporting limits adjusted to reflect sample dilutions?	Yes			
Were all soil samples dry weight corrected?	Yes			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	Yes			

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date: 3/6/2024
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			
		s6					
		s7					
		s8					
		s9					
		s10					
		s11					
		s12					

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.201	0.2		100.5	101	Y
Calibration verification	Cyanide	5.09377	5.00		101.8754	102	Y
Calibration verification	Cyanide	5.21671	5.00		104.3342	104	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1942504-2	LCS	Cyanide	69.2	76.0	91.03492105	91	Y
3	MS	Cr(VI)	1421.21951	1520	93.50128355	93	Y
3, 4	MS/MSD RPD*	Cyanide	14.4849238	14.7082317	1.529864766	0	Y

*Lab calculated MS/MSD RPD using rounded %R's

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/Kg)	Recalculated Result (mg/Kg)	Acceptable (Y/N)
1	Cyanide	-0.02644	1	1.071	50	65.6	0.30U	-0.040304878	Y
2	Cr(VI)	0.000	1	2.5214	100	88.4	0.181U	0	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2436294
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
D10_2-4	L2436294-02	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	None Associated
Field Duplicate pair:	None Associated

The above-listed soil sample was collected on June 17, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951E
SDG #: L2436294
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: CF

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /S	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D10_2-4	L2436294-02		Soil	06/17/2024	Category B

Notes:

WG1939887-1 BLANK		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60951E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDD (CLP1)	1.056	1.056	1.101	1.101	14.71	14.69
			4,4'-DDD (CLP2)	0.993	0.993	0.996	0.996	8.01	8.00

LDC# 60951E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940414-1 PEST15	06/27/24	Dieldrin (CLP1)	1.322	1.286	1.286	2.7	2.7
			Dieldrin (CLP2)	1.156	1.276	1.276	10.4	10.4
			4,4'-DDD (CLP1)	1.101	1.046	1.046	5.0	5.0
			4,4'-DDD (CLP1)	0.996	1.053	1.053	5.7	5.7

LDC # 60951E

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:__JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	36.06	72	72	0
Tetrachloro-m- xylene	CLP2	50.0	37.05	74	74	0
Decachlorobiphenyl	CLP1	50.0	39.24	78	78	0
Decachlorobiphenyl	CLP2	50.0	43.10	86	86	0

LDC # 60951E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1939887-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.7	32.1	26.6	22.6	84	84	70	70	18	16
DDT	31.7	32.1	28.5	25.0	90	90	78	78	14	13

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	DDT	149000000	92282441	25.000	1.1130	10.00	15.62	1.00	NA	23.2	23.2	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436294
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
D10_2-4	L2436294-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 17, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Validation Action
06/27/24	R1846491-41	Thallium	111 (90-110)	D10_2-4	J (all detects)

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.571 mg/Kg	2.855 mg/Kg	D10_2-4
ICB/CCB	Aluminum	1.352 mg/L	6.760 mg/Kg	D10_2-4
	Arsenic	0.0872 mg/L	0.436 mg/Kg	
	Beryllium	0.01596 mg/L	0.080 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Matrix spike (MS) sample analysis was performed on an associated project sample. For C10_2-4MS, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Laboratory Duplicate Results

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (≤20)	Difference (≤3.60)	Validation Action
C10_2-4DUP (D10_2-4)	Cobalt	-	4.06	J (all detects)
	Manganese	41	-	UJ (all non-detects)
	Potassium	21	-	

Serial Dilution

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
D10_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951E
SDG #: L2436294
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	SW	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	SW	C10_2-4MS: Several analytes > 4X spike amount, %R
VIII	Laboratory Duplicate	SW	C10_2-4DUP
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D10_2-4 2X, 6010D, matrix	L2436294-02		Soil	06/17/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?		NO		
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
All initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were performed at the required frequency and were within the acceptance limits with the following exceptions:

Date	Time	Calibration ID	Analyte	%R	%R Limits	Associated Samples	Qualification	Det/ND
06/27/24	23:10	R1846491-41	Tl	111	90-110	All	Jdet/A	Det

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.571		2.855					
Aluminum		1.352	6.760					
Arsenic		0.0872	0.436					
Beryllium		0.01596	0.080					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Laboratory duplicate analysis was performed by the laboratory. All laboratory duplicates were with the relative percent difference (RPD) for samples >5X the reporting limits with the exceptions listed below. If samples were <5X the reporting limits, the difference was within 1X the reporting limit for water samples and within 2X the reporting limit for soil samples for all samples with the exceptions listed below.

Duplicate ID	Matrix	Analyte	RPD	RPD Limit	Difference (mg/Kg)	Difference Limit (2X RL)	Associated Samples	Qualification	Det/ND
C10-2-4DUP	Soil	Cobalt			4.06	3.60	All	J/UJ/A	Det
		Manganese	41	20			↓	↓	↓
		Potassium	21	↓			↓	↓	ND

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1846491-3 ICV	ICP	Be	0.5248	0.500	104.96	105	Y
R1846491-41 CCV	ICP	Mn	0.5183	0.5000	103.66	104	Y
R1846491-5 ICSA	ICP	Ca	472.8544	500	94.57088	95	Y
R1846507-1 ICV	CVAA	Hg	0.002851	0.00300	95.03333333	95	Y
R1846507-23 CCV	CVAA	Hg	0.009844	0.0100	98.44	98	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1939870-2	LCS	Hg	1.61683333	1.7	96.35478725	97	Y
WG1939869-2	LCS	Sb	42.35	40.0	105.88	106	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cr	0.2791	2	1.287	50	95.1	23	22.80346129	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2436308
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E10_2-4	L2436308-04	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	None Associated
Field Duplicate pair:	None Associated

The above-listed soil sample was collected on June 18, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/28/24	WG1940711-1	CLP2	Methoxychlor	20.4	E10_2-4	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
E10_2-4	trans-Chlordane	149	J (all detects)
	Chlordane	53	J (all detects)
	Dieldrin	43	J (all detects)
	cis-Chlordane	71	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951F
SDG #: L2436308
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r2 ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /S	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E10_2-4	L2436308-04		Soil	06/18/2024	Category B

Notes:

WG1940369-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951F

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	6/28/2024	WG1940711-1	CLP2	Methoxychlor	20.4	ALL (ND)	J/UJ/A

LDC#: 60951F

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	trans-Chlordane	149	J det/A
		Chlordane	53	
		Dieldrin	43	
		cis-Chlordane	71	

Comments:_____

LDC# 60951F

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDD (CLP1)	1.056	1.056	1.101	1.101	14.71	14.69
			4,4'-DDD (CLP2)	0.993	0.993	0.996	0.996	8.01	8.00

LDC# 60951F

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1940711-1 PEST15	06/28/24	Dieldrin (CLP1)	1.322	1.325	1.325	0.2	0.2
			Dieldrin (CLP2)	1.156	1.350	1.350	16.8	16.8
			4,4'-DDD (CLP1)	1.101	1.066	1.066	3.2	3.2
			4,4'-DDD (CLP1)	0.996	1.097	1.097	10.1	10.1

LDC # 60951F

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	31.12	62	62	0
Tetrachloro-m- xylene	CLP2	50.0	37.73	75	75	0
Decachlorobiphenyl	CLP1	50.0	31.52	63	63	0
Decachlorobiphenyl	CLP2	50.0	40.52	81	81	0

LDC # 60951F

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1940369-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.3	31.9	25.8	28.3	80	80	89	89	11	9
DDT	32.3	31.9	25.9	28.4	80	80	89	89	11	9

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Heptachlor epoxide	277100000	197800000	25.000	1.1970	10.00	15.58	1.00	0.880	21.3	21.4	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436308
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E10_2-4	L2436308-04	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 18, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.71 mg/Kg	3.550 mg/Kg	E10_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E10 2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951F
SDG #: L2436308
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E10_2-4 2X, 6010D, matrix	L2436308-04		Soil	06/18/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.71		3.550					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1847113-3 ICV	ICP	Cd	0.5136	0.500	102.72	103	Y
R1847113-22 CCV	ICP	Cu	0.4708	0.5000	94.16	94	Y
R1847113-5 ICSA	ICP	Fe	189.5095	200	94.75475	95	Y
R1847060-1 ICV	CVAA	Hg	0.002903	0.00300	96.76666667	97	Y
R1847060-7 CCV	CVAA	Hg	0.010072	0.0100	100.72	101	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1940366-2	LCS	Hg	1.68016667	1.7	100.6087826	101	Y
WG1940363-2	LCS	Na	831.936	800	103.992	104	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Ba	1.2534	2	1.273	50	88	112	111.8867386	Y
1	Hg (ug/L)	0.464	1	0.398	50	88	0.066	0.066240292	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2436354
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
B4_4-6	L2436354-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 13, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/30/24	wg1941361-1	CLP2	Endrin aldehyde	20.2	B4 4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG1940553-2,3 LCS/LCSD (B4_4-6)	delta-BHC	45	None
	Lidane	45	
	alpha-BHC	47	
	beta-BHC	40	
	Heptachlor	45	
	Aldrin	46	
	Heptachlor epoxide	44	
	Endrin	48	
	Endrin aldehyde	45	
	Endrin ketone	44	
	Dieldrin	46	
	4,4'-DDE	48	
	4,4'-DDD	46	
	4,4'-DDT	44	
	Endosulfan I	46	
	Endosulfan II	43	
	Endosulfan sulfate	44	
	Methoxychlor	43	
	cis-Chlordane	45	
	trans-Chlordane	45	

No data were qualified due to high %Rs when the associated results were non-detected.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951G
SDG #: L2436354
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /S	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	B4_4-6 -	L2436354-01		Soil	06/13/2024	Category B

Notes:

WG1940553-1 BLANK		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. trans–Heptachlor epoxide
B. beta-BHC	L. Endosulfan II	V. Aroclor 1016	FF. Hexachlorobenzene	PP. Mirex
C. delta-BHC	M. 4,4'-DDD	W. Aroclor 1221	GG. Chlordane	QQ cis-Chlordane
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor 1232	HH. Chlordane (Technical)	RR. trans-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor 1242	II. Aroclor 1262	SS. Hexachlorobutadiene
F. Aldrin	P. Methoxychlor	Z. Aroclor 1248	JJ. Aroclor 1268	TT. Kepone
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor 1254	KK. Oxychlordane	UU. Chlorpyrifos
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor 1260	LL. trans-Nonachlor	VV
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. cis-Nonachlor	WW.
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. cis–Heptachlor epoxide	XX.

Notes:_____

LDC#: 60951G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	6/30/2024	wg1941361-1	CLP2	Endrin Aldehyde	20.2	All (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1940553-2,3 LCS/D	See attached					30	ALL (ND)	J det/P

Laboratory Control Sample Summary
Form 3
Pesticides

Client	: Roux Env. Eng. & Geology, DPC	**Lab Number**	: L2436354
Project Name	: ELMWOOD PRESERVE	**Project Number**	: 3858.0004Y000
Matrix (Level)	: SOIL (LOW)		
LCS Sample ID	: WG1940553-2 **Analysis Date** : 06/29/24 11:35	**File ID**	: 20240629a-11
LCSD Sample ID	: WG1940553-3 **Analysis Date** : 06/29/24 11:47	**File ID**	: 20240629a-12

		Laboratory Control Sample			Laboratory Control Duplicate						
Parameter		True (ug/kg)	Found (ug/kg)	%R	True (ug/kg)	Found (ug/kg)	%R	RPD		Recovery Limits	RPD Limit
Delta-BHC	C	32.3	12.4	38	31.7	19.1	60	45	Q	30-150	30
Lindane		32.3	11.8	36	31.7	18.2	57	45	Q	30-150	30
Alpha-BHC	A	32.3	12.1	37	31.7	18.9	60	47	Q	30-150	30
Beta-BHC	B	32.3	12.3	38	31.7	18.1	57	40	Q	30-150	30
Heptachlor	E	32.3	11.7	36	31.7	18.1	57	45	Q	30-150	30
Aldrin	F	32.3	12.1	37	31.7	18.8	59	46	Q	30-150	30
Heptachlor epoxide	G	32.3	12.0	37	31.7	18.4	58	44	Q	30-150	30
Endrin	K	32.3	13.4	41	31.7	21.2	67	48	Q	30-150	30
Endrin aldehyde	R	32.3	12.2	38	31.7	19.0	60	45	Q	30-150	30
Endrin ketone	Q	32.3	13.3	41	31.7	20.3	64	44	Q	30-150	30
Dieldrin	I	32.3	14.2	44	31.7	22.3	70	46	Q	30-150	30
4,4'-DDE	J	32.3	13.0	40	31.7	20.5	65	48	Q	30-150	30
4,4'-DDD	M	32.3	14.4	44	31.7	22.2	70	46	Q	30-150	30
4,4'-DDT	O	32.3	13.8	43	31.7	21.3	67	44	Q	30-150	30
Endosulfan I	H	32.3	12.5	39	31.7	19.8	62	46	Q	30-150	30
Endosulfan II	L	32.3	13.6	42	31.7	20.7	65	43	Q	30-150	30
Endosulfan sulfate	N	32.3	13.8	43	31.7	21.4	67	44	Q	30-150	30
Methoxychlor	P	32.3	15.5	48	31.7	23.6	74	43	Q	30-150	30
cis-Chlordane	QQ	32.3	12.3	38	31.7	19.2	60	45	Q	30-150	30
trans-Chlordane	RR	32.3	13.8	43	31.7	21.5	68	45	Q	30-150	30

Jdelta/P

LDC#: 60951G

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	6/25/2024	Dieldrin (CLP1)	1.346	1.347	1.418	1.418	5.52	5.52
			Dieldrin (CLP2)	1.209	1.209	1.286	1.286	5.05	5.06
			4,4'-DDD (CLP1)	1.092	1.092	1.114	1.115	5.64	5.64
			4,4'-DDD (CLP2)	0.980	0.980	1.025	1.025	5.90	5.91

LDC# 60951G

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941361-1 PEST11	06/30/24	Dieldrin (CLP1)	1.418	1.464	1.464	3.2	3.2
			Dieldrin (CLP2)	1.286	1.320	1.321	2.6	2.6
			4,4'-DDD (CLP1)	1.114	1.157	1.157	3.9	3.9
			4,4'-DDD (CLP2)	1.025	1.033	1.033	0.8	0.8

LDC # 60951G

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	26.68	53	53	0
Tetrachloro-m- xylene	CLP2	50.0	32.99	66	66	0
Decachlorobiphenyl	CLP1	50.0	20.61	41	41	0
Decachlorobiphenyl	CLP2	50.0	30.60	61	61	0

LDC # 60951G

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1940553-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.3	31.7	11.8	18.2	37	37	57	57	45	43
DDT	32.3	31.7	13.8	21.3	43	43	67	67	44	43

LDC # 60951G

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	DDT	49158601	51621794	25.000	1.1120	10.00	15.46	1.00	NA	13.8	13.8	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436601
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 10, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I4_0.2-2	L2436601-06	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06272024
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 27, 2024 and was analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/01/24	V17240701N19.D	Vinyl acetate	33.2	I4_0.2-2	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/02/24	V17240702N01.D	Dichlorodifluoromethane	21.0	I4_0.2-2	UJ (all non-detects)
		Chloromethane	20.7		UJ (all non-detects)
		1,1-Dichloroethene	79.6		UJ (all non-detects)
		Carbon disulfide	47.8		UJ (all non-detects)
		Methylene chloride	20.2		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/03/24	ABN0703.D	2-Nitrophenol	27.4	I4_0.2-2	UJ (all non-detects)
		2-Nitroaniline	28.0		UJ (all non-detects)
		2,4-Dinitrotoluene	21.7		UJ (all non-detects)
		Bis(2-ethylhexyl)phthalate	22.8		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/05/24	WG1943328-3	CLP1	Toxaphene	29.8	I4_0.2-2	UJ (all non-detects)
07/05/24	WG1943328-3	CLP2	Toxaphene	44.5	I4_0.2-2	UJ (all non-detects)

PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG1942980-5BLANK	Methylene chloride	2.4 ug/Kg	RL	I4_0.2-2
	Bromomethane	1.2 ug/Kg	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the trip blank sample TB_06272024 for VOC analysis.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC, SVOC, PCB

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were not within QC limits. No data were qualified since there were no associated samples in this SDG. Relative percent differences (RPD) were within QC limits.

Herbicide

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1942980-3,4 LCS/LCSD (I4_0.2-2)	1,1-Dichloroethene Carbon disulfide	180 (65-135) 148 (59-130)	- -	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG1942980-3,4 LCS/LCSD (I4_0.2-2)	1,1-Dichloroethene Carbon disulfide	29 55	None

No data were qualified due to high RPDs when the associated results were non-detected.

SVOC, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the VOC, SVOC, pesticide, PCB and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
I4_0.2-2	cis-Chlordane	147	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SVG
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/SW	RSD ≤ 20% or ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	SW	
VI	Field Blank	ND	TB = TB_06272024 (same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2	L2436601-06		Soil	06/27/2024	Category B

Notes:

WG1942980-5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 30%?		√		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?	√			
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤30%)	Associated samples	Qualifications
	7/1/2024	V17240701N19.D	Vinyl acetate	33.2	ALL (ND)	J/UJ/A

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	7/2/2024	V17240702N01.D	Dichlorodifluoromethane	21.0		All (ND)	J/UJ/A
			Chloromethane	20.7			
			1,1-Dichloroethene	79.6			
			Carbon disulfide	47.8			
			Methylene chloride	20.2			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: ____07/2/24_____ **Associated samples:**_____All (ND)____
Conc. units: __ug/Kg_____

Compound	Blank ID	Sample Identification							
	WG1942980-5BLANK								
Methylene chloride	2.4								
Bromomethane	1.2								

Blank analysis date: _____ **Associated samples:**_____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG1942980-3,4 LCS/D	1,1-Dichloroethene	180	-	65-135			All (ND)	J det/P
	Carbon disulfide	148	-	59-130				
	1,1-Dichloroethene				29	30		
	Carbon disulfide				55	30	✓	✓

LDC #: 60150H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 20 std)	Recalculated RRF (RRF 20 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA117	07/01/24	Trichloroethene (FBZ)	0.271	0.271	0.266	0.266	18.94	18.98
			Ethylbenzene (CBZ)	1.550	1.550	1.548	1.548	10.84	10.85
			Naphthalene (DCB)	1.730	1.730	1.599	1.599	5.10	5.10

LDC # 60150H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V17240702N01.D	07/02/04	Trichloroethene	(FBZ)	0.266	0.237	0.237	10.9	10.9
			Ethylbenzene	(CBZ)	1.548	1.360	1.360	12.1	12.1
			Naphthalene	(DCB)	1.599	1.441	1.441	9.9	9.9

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.68	103	103	0
1,2-Dichloroethane-d4	20.0	19.86	99	99	0
Toluene-d8	20.0	20.61	103	103	0
4-Bromofluorobenzene	20.0	20.78	104	104	0

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1942980-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	71.853	39.311	180	180	98	98	59	59
Benzene	40.00	40.00	34.864	35.553	87	87	89	89	2	2
Trichloroethene	40.00	40.00	35.690	36.982	89	89	92	92	3	4
Toluene	40.00	40.00	35.581	36.329	89	89	91	91	2	2
Chlorobenzene	40.00	40.00	35.789	36.472	90	89	91	91	1	2

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
LCS	TCE	104987	221121	20.0	0.266	1.0	5.00	5.00	na	35.7	36	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/29/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer: CT

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2	L2436601-06		Soil	06/27/2024	Category B

Notes:

WG1942599-1 BLK		

LDC#: 60951H

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: SVOA (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤ 20%)	RRF (Limits)	Associated samples	Qualifications
	7/3/2024	ABN0703.D	2-Nitrophenol	27.4		ALL (ND)	J/UJ/A
			2-Nitroaniline	28.0			
			2,4-Dinitrotoluene	21.7			
			Bis(2-ethylhexyl)phthalate	22.8			

	DOD	NFG	
%D	20%/50%	Method criteria	RRF: 0.05

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL SV109	6/17/2024	Phenol (DCB)	1.497	1.497	1.329	1.329	7.87	7.88
			Naphthalene (NPT)	1.011	1.011	1.008	1.008	4.08	4.09
			Diethylphthalate (ANT)	1.383	1.383	1.327	1.328	5.61	5.60
			Fluoranthene (PHN)	1.206	1.206	1.175	1.175	7.98	7.99
			Chrysene (CRY)	1.228	1.228	1.226	1.226	2.74	2.74
			Benzo(g,h,i)perylene (PRY)	1.105	1.105	1.077	1.077	8.05	8.07

LDC#: 60951H

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0703	07/03/24	Phenol (DCB)	1.329	1.342	1.342	1.0	1.0
			Naphthalene (NPT)	1.008	1.019	1.019	1.1	1.1
	SV109		Diethylphthalate (ANT)	1.327	1.337	1.337	0.8	0.8
			Fluoranthene (PHN)	1.175	1.202	1.202	2.3	2.3
			Chrysene (CRY)	1.226	1.246	1.246	1.6	1.6
			Benzo(g,h,i)perylene (PRY)	1.077	1.127	1.127	4.6	4.6

LDC # 60951D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	12.026	48	48	0
2-Fluorobiphenyl	25.000	11.127	45	45	0
Terphenyl-d14	25.000	11.889	48	48	0
Phenol-d5	50.000	23.367	47	47	0
2-Fluorophenol	50.000	21.867	44	44	0
2,4,6-Tribromophenol	50.000	27.988	56	56	0

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1942599-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	30.383	31.131	76	76	78	78	3	2
N-Nitroso-di-n-propylamine	40.0	40.0	30.391	29.470	76	76	74	74	3	3
4-Chloro-3-methylphenol	40.0	40.0	34.755	34.516	87	87	86	86	1	1
Acenaphthene	40.0	40.0	30.303	30.158	76	76	75	75	1	0
Pentachlorophenol	40.0	40.0	30.235	29.715	76	76	74	74	3	2
Pyrene	40.0	40.0	36.508	36.850	91	91	92	92	1	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
LCS	Phenol	100655	104116	40.0	1.273	1.00	1000.0	30.67	NA	990	990	0
from MORK)												

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer: CL

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	L2436601-13 No MS NQ
IX	Laboratory Control Sample	A	LCS/D (no associated sample)
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2	L2436601-06		Soil	06/27/2024	Category B

Notes:

WG1942606-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/5/2024	WG1943328-3	CLP1	Toxaphene	29.8	ALL (ND)	J/UJ/A
			CLP2	Toxaphene	44.5		

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	cis-Chlordane	147	J det/A

Comments:_____

_____

_____

LDC# 60951H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10

LDC# 60951H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941876-1 PEST18	07/05/24	Dieldrin (CLP1)	1.294	1.383	1.383	6.9	6.9
			Dieldrin (CLP2)	1.124	1.253	1.253	11.5	11.5
			4,4'-DDD (CLP1)	1.056	1.137	1.137	7.7	7.7
			4,4'-DDD (CLP2)	0.929	1.015	1.015	9.3	9.3

LDC # 60951H

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	36.39	73	73	0
Tetrachloro-m- xylene	CLP2	50.0	39.88	80	80	0
Decachlorobiphenyl	CLP1	50.0	43.10	86	86	0
Decachlorobiphenyl	CLP2	50.0	51.30	103	103	0

LDC # 60951H

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1942606-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.2	31.7	27.9	26.0	87	87	82	82	6	7
DDT	32.2	31.7	30.8	28.4	96	96	90	90	6	8

LDC # 60951H

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	505400000	216200000	25.000	1.1242	10.00	15.41	1.00	0.814	41.4	41.4	0
	CLP2											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: AVY
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A/A	RSDs 20% ICVs 20%
III	Continuing Calibration	A	CCVs 20%
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes/IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2	L2436601-06		Soil	06/27/2024	Category B

Notes:

WG1942616-1 Blk		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/12/2024	1260-1 (CLP1)	0.058	0.058	0.055	0.055	2.68	2.90
			1260-1 (CLP2)	0.048	0.048	0.049	0.049	4.36	4.46

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942690-2	07/03/24	1260-1 (CLP1)	0.055	0.049	0.049	10.9	10.9
			1260-1 (CLP2)	0.049	0.045	0.045	8.2	8.2

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG__

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	379.690	76	76	0
Tetrachloro-m- xylene	RTX-CLP2	500	421.004	84	84	0
Decachlorobiphenyl	RTX-CLP1	500	452.113	90	90	0
Decachlorobiphenyl	RTX-CLP2	500	473.380	95	95	0

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1942616-2,3 LCS/D

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	302	299	341	362	113	113	121	121	7	6

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
LCS	1260	4.768E+08	5.693E+08	250	0.061	5.00	10.36	1.00	NA	**3420.40**	2420.53	0
	CLP1 PEST13											
											Reported	
	1260-Total =	(3420.4+3507.876+3494.092+3629.462+3630.75)						conc =	(3536.52)(5mL)		**final conc**	
			5						(10.36g)(5mL)			
	=	3536.52						=	**341.4**		**341.0**	
	clean-up vol = 5 mL											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JRG
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSDs 20% ICVs 20%
III	Continuing Calibration	A	CCVs 20%
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Surrogate Spikes 1,3	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	L2436601-13
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2	L2436601-06		Soil	06/27/2024	Category B

Notes:

WG1942390-1 Blk		

Method: GC Herbicides (EPA SW 846 Method 8151A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			√	
Were the RT windows properly established?	√			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
V. Field Blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60951H

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (0.40 std)	Recalculated RRF (0.40 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST16	4/12/2024	2,4-D (CLP1)	0.124	0.124	0.132	0.132	12.37	12.35
			2,4-D (CLP2)	0.200	0.200	0.217	0.217	15.44	15.41

LDC# 60951D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942144-8	07/03/24	2,4-D (CLP1)	0.132	0.132	0.132	0	0.3
	PEST16		2,4-D (CLP2)	0.217	0.237	0.237	9.2	9.2

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
BB (1C)	0.500	0.357	71	71	0
BB (2C)	0.500	0.381	76	76	0

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DCAA)	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic acid	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: __L2436601-13 MS/MSD___

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	223	221	0	202	173	91	91	78	78	15	15

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1942390-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	164.0	164.0	143.0	150.0	87	87	91	91	4	5

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (uL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	2,4-D	212000000	918100000	0.250	0.1324	10000	30.41	1.00	NA	143.4	143.0	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436601
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I4_0.2-2	L2436601-06	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 27, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.827 mg/Kg	4.135 mg/Kg	I4_0.2-2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Wet Chemistry

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
I6_0-0.2MS/MSD	Chromium	-	67 (75-125)	J (all detects)
(I4_0.2-2)	Zinc	73 (75-125)	59 (75-125)	J (all detects)

For I6_0-0.2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
I6_0-0.2MS (I4_0.2-2)	Hexavalent chromium	71 (75-125)	UJ (all non-detects)
I6_0-0.2MS Soluable (I4_0.2-2)	Hexavalent chromium	47 (75-125)	UJ (all non-detects)

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

Metals

All criteria were met.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1942857-2/3 (I4_0.2-2)	Cyanide	78 (80-120)	-	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I4_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	SW	I6_0-0.2MS/MSD: Several analytes > 4X spike amount, %R
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2 2X, 6010D, matrix	L2436601-06		Soil	06/27/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.827		4.135					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
I6_0-0.2	Soil	Cr		67	75-125			All	J/UJ/A	Det PDS = 88%
		Zn	73	59	↓				↓	Det PDS = 78%

Comments: I6_0-0.2MS/MSD: Several analytes > 4X spike amount, %R

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1849484-3 ICV	ICP	Zn	0.5035	0.500	100.7	101	Y
R1849484-18 CCV	ICP	Mn	0.4940	0.5000	98.8	99	Y
R1849484-5 ICSA	ICP	Mg	464.7208	500	92.94416	93	Y
R1848914-1 ICV	CVAA	Hg	0.003138	0.00300	104.6	105	Y
R1848914-23 CCV	CVAA	Hg	0.009853	0.0100	98.53	99	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1941991-2	LCS	Hg	1.66516667	1.7	99.71057904	100	Y
WG1942024-2	LCS	Pb	40.35	42.4	95.16981132	95	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	As	0.2579	2	1.260	50	81.4	25.1	25.14527515	Y
1	Hg (ug/L)	1.560	1	0.368	50	81.4	0.260	0.260388847	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951H
SDG #: L2436601
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Matrix Spike/Matrix Spike Duplicate	SW	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	SW	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_0.2-2	L2436601-06		Soil	06/27/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Cyanide, Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	Yes			
II/III Calibration				
Were all instruments calibrated at the required frequency?	Yes			
Were the proper number of standards used?	Yes			
Were all initial and continuing calibration verifications within the QC limits?	Yes			
Were all initial calibration correlation coefficients within limits as specifed by the method?	Yes			
Were balance checks performed as required?			NA	
IV Blanks				
Was a method blank associated with every sample in this SDG?	Yes			
Was there contamination in the method blanks?		No		
Was there contamination in the initial and continuing calibration blanks?		No		
V. Field Blanks				
Were field blanks identified in this SDG?		No		
Were target analytes detected in the field blanks?			NA	
VI. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		No		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	

VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	Yes			
Were the LCS recoveries and RPDs (if applicable) within QC limits?		No		
IX. Field Duplicates				
Were field duplicates identifed in this SDG?		No		
Were target analytes detected in the field duplicates?			NA	
X. Sample Result Verification				
Were all reporting limits adjusted to reflect sample dilutions?	Yes			
Were all soil samples dry weight corrected?	Yes			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	Yes			

METHOD: Inorganics

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
I6_0-0.2MS	Soil	Cr(VI)	71	75-125	All	J/UJ/A	ND PDS = 87%
I6_0-0.2MS Soluable	Soil	Cr(VI)	47	75-125	All	J/UJ/A	ND

Comments:

METHOD: Inorganics

A LCS/LCSD was analzyed for each matrix at the required frequencies. All LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

LCS/LCSD ID	Matrix	Analyte	LCS %R	LCSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
WG1942857-2/3	Soil	Cyanide	78		80-120			1	J/UJ/A	ND

Comments:

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.

Calibration date: 3/6/2024

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			
		s6					
		s7					
		s8					
		s9					
		s10					
		s11					
		s12					

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.186	0.2		93	93	Y
Calibration verification	Cyanide	4.97373	5.00		99.4746	99	Y
Calibration verification	Cyanide	5.30063	5.00		106.0126	106	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1942857-2	LCS	Cyanide	59.59769	76.0	78.41801316	78	Y
WG1943120-2	LCS	Cr(VI)	222.340611	192	115.8024016	116	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/Kg)	Recalculated Result (mg/Kg)	Acceptable (Y/N)
1	Cr(VI)	0.000	1	2.4665	100	81.4	0.196U	0	Y
1	Cyanide	0.07111	1	1.0618	50	81.4	0.24U	0.087358722	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2436873
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E12_2-4	L2436873-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 19, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
06/30/24	WG1941346-1	CLP1	Endrin aldehyde	26.8	E12_2-4	UJ (all non-detects)
			Endosulfan sulfate	22.8		UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
E12_2-4	cis-Chlordane	98.8	J (all detects)
	trans-Chlordane	54.2	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951I
SDG #: L2436873
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer: CF

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD≤ 20% or r≥ 0.99
IV	Continuing Calibration	SW	ccv≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_2-4	L2436873-01		Soil	06/19/2024	Category B

Notes:

WG1941020-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951I

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	6/30/2024	WG1941346-1	CLP1	Endrin Aldehyde	26.8	ALL (ND)	J/UJ/A
				Endosulfan Sulfate	22.8	↓	↓

LDC#: 60951I

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	cis-Chlordane	98.8	J det/A
		trans-Chlordane	54.2	

Comments:_____

LDC# 60951I

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST15	6/12/2024	Dieldrin (CLP1)	1.253	1.253	1.322	1.322	15.57	15.57
			Dieldrin (CLP2)	1.148	1.148	1.156	1.156	8.14	8.13
			4,4'-DDD (CLP1)	1.056	1.056	1.101	1.101	14.71	14.69
			4,4'-DDD (CLP2)	0.993	0.993	0.996	0.996	8.01	8.00

LDC# 60951I

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941346-1 PEST15	06/30/24	Dieldrin (CLP1)	1.322	1.239	1.239	6.3	6.3
			Dieldrin (CLP2)	1.156	1.299	1.299	12.4	12.4
			4,4'-DDD (CLP1)	1.101	1.002	1.002	9.0	9.0
			4,4'-DDD (CLP1)	0.996	1.052	1.052	5.6	5.6

LDC # 60951I

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1__

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	34.90	70	70	0
Tetrachloro-m- xylene	CLP2	50.0	40.54	81	81	0
Decachlorobiphenyl	CLP1	50.0	32.31	65	65	0
Decachlorobiphenyl	CLP2	50.0	37.13	74	74	0

LDC # 60951I

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1941020-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.9	32.3	30.8	28.4	97	97	88	88	10	8
DDT	31.9	32.3	31.9	30.1	100	100	93	93	7	6

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	8042337	98049668	25.000	1.3220	10.00	15.51	1.00	0.779	1.28	1.28	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2436873
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E12_2-4	L2436873-01	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 19, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Chromium	0.453 mg/Kg	2.265 mg/L	E12_2-4
	Iron	3.53 mg/Kg	17.650 mg/L	
	Manganese	0.161 mg/Kg	0.805 mg/L	
	Nickel	0.898 mg/Kg	4.490 mg/L	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E12 2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951I
SDG #: L2436873
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E12_2-4 2X, 6010D, sample matrix	L2436873-01		Soil	06/19/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Chromium	0.453		2.265					
Iron	3.53		17.650					
Manganese	0.161		0.805					
Nickel	0.898		4.490					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1847903-3 ICV	ICP	Al	0.4982	0.500	99.64	100	Y
R1847903-40 CCV	ICP	Ni	0.5219	0.5000	104.38	104	Y
R1847903-5 ICSA	ICP	Ca	447.9379	500	89.58758	90	Y
R1847862-1 ICV	CVAA	Hg	0.003096	0.00300	103.2	103	Y
R1847862-15 CCV	CVAA	Hg	0.009909	0.0100	99.09	99	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1941167-2	LCS	Hg	1.683	1.7	100.7784431	101	Y
WG1941166-2	LCS	As	10.29	9.60	107.1666667	107	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	K	20.5296	2	1.278	50	77.9	2060	2062.111652	Y
1	Hg (ug/L)	0.402	1	0.393	50	77.9	0.066	0.065654734	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2437014
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 10, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I11_0-0.2	L2437014-09	Pesticide, Herbicide
I12_0.2-2	L2437014-14	VOC, SVOC, Pesticide, PCB, Herbicide
I12_0.2-2MS	L2437014-14MS	VOC, SVOC, Pesticide, PCB, Herbicide
I12_0.2-2MSD	L2437014-14MSD	VOC, SVOC, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_06282024, FB_06282024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 28, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
04/10/24	ICAL VOA104	1,4-Dioxane	0.002	I12_0.2-2	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
06/28/24	V04240703A01.D	Bromomethane	26.7	I12_0.2-2	UJ (all non-detects)
		2-Butanone	25.8		UJ (all non-detects)
		2-Hexanone	22.2		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/28/24	V04240703A01.D	1,4-Dioxane	0.00188	I12_0.2-2	UJ (all non-detects)

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/06/24	wg1943768-1	CLP1	Methoxychlor	24.8	I11_0-0.2	UJ (all non-detects)
07/06/24	wg1943768-3	CLP1	Toxaphene	60.4	I11_0-0.2	UJ (all non-detects)
07/06/24	wg1943768-3	CLP2	Toxaphene	31.3	I11_0-0.2	UJ (all non-detects)

SVOC, PCB, Herbicide

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG1943498-5BLANK	Methylene chloride	9.8 ug/Kg	RL	I12_0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the trip blank sample TB_06282024 for VOC analysis.

Contamination was detected in the field blank sample FB_06282024 for VOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06282024	Acetone	5.8 ug/L	RL	I12_0.2-2

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

SVOC, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_06282024 for SVOC, pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
I12_0.2-2MS/MSD (I12_0.2-2)	Bromoform	64 (70-130)	-	UJ (all non-detects)
	1,1,2,2-Tetrachloroethane	67 (70-130)	-	UJ (all non-detects)
	1,2-Dichlorobenzene	59 (70-130)	69 (70-130)	UJ (all non-detects)
	1,3-Dichlorobenzene	64 (70-130)	-	UJ (all non-detects)
	1,4-Dichlorobenzene	62 (70-130)	-	UJ (all non-detects)
	2-Butanone	63 (70-130)	68 (70-130)	UJ (all non-detects)
	Vinyl acetate	19 (70-130)	19 (70-130)	UJ (all non-detects)
	1,2,3-Trichloropropane	67 (68-130)	-	UJ (all non-detects)
	2-Hexanone	60 (70-130)	64 (70-130)	UJ (all non-detects)
	n-Butylbenzene	69 (70-130)	-	UJ (all non-detects)
	o-Chlorotoluene	68 (70-130)	-	UJ (all non-detects)
	p-Chlorotoluene	65 (70-130)	-	UJ (all non-detects)
	1,2-Dibromo-3-chloropropane	63 (68-130)	-	UJ (all non-detects)
	Hexachlorobutadiene	61 (67-130)	-	UJ (all non-detects)
	Naphthalene	46 (70-130)	56 (70-130)	UJ (all non-detects)
	1,2,3-Trichlorobenzene	45 (70-130)	54 (70-130)	UJ (all non-detects)
	1,2,4-Trichlorobenzene	52 (70-130)	62 (70-130)	UJ (all non-detects)
	1,2,4-Trimethylbenzene	68 (70-130)	-	UJ (all non-detects)
	1,2,4,5-Tetramethylbenzene	61 (70-130)	-	UJ (all non-detects)
	trans-1,4-Dichloro-2-butene	61 (70-130)	67 (70-130)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Pesticide

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (30-150)	MSD %R (30-150)	Validation Action
I12_0.2-2MS/MSD (I12_0.2-2)	Dieldrin	-	165	J (all detects)
I12_0.2-2MS/MSD (I12_0.2-2)	Delta-BHC	166	218	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC, PCB, Herbicide

All criteria were met.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the SVOC, pesticide, and PCB analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
I11_0-0.2	Dieldrin	44.0	J (all detects)
	cis-Chlordane	161	J (all detects)
I12_0.2-2	cis-Chlordane	122	J (all detects)
	Chlordane	45.0	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SW
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/A	RSD ≤ 20% r² ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06282024 same SDG *TB = TB_
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable * ND = Not detected FT = Field triplicate AB= Ambient blank R = Rinsate
N = Not provided/applicable NQ = Not qualified TB = Trip blank SB = Source blank
SW = See worksheet FD = Field duplicate FB = Field blank EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12_0.2-2	L2437014-14		Soil	06/28/2024	Category B
2	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
3	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B

Notes:

WG1943498- 5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?	√			
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	4/10/2024	ICAL VOA104	1,4-Dioxane		0.002 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/28/2024	V04240703A01.D	Bromomethane	26.7		All (ND)	J/UJ/A
			2-Butanone	25.8			
			2-Hexanone	22.2			
			1,4-Dioxane		0.00188 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: ____07/03/24_____ **Associated samples:**_____All (ND)_____
Conc. units: __ug/Kg_____

Compound	Blank ID	Sample Identification							
	WG1943498-5BLANK								
Methylene chloride	9.8								

Blank analysis date: _____ **Associated samples:**_____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 6/28/2024 **Blank units:** ug/L **Associated sample units:** ug/Kg
Field blank type: FB **Associated Samples:** ALL (ND)

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB_06282024								
Acetone	5.8								

Sampling date: **Blank units:** **Associated sample units:**

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	Bromoform	64	-	70-130			1 (ND)	J/UJ/A
	1,1,2,2-Tetrachloroethane	67	-					
	1,2-Dichlorobenzene	59	69					
	1,3-Dichlorobenzene	64	-					
	1,4-Dichlorobenzene	62	-					
	2-Butanone	63	68					
	Vinyl acetate	19	19					
	1,2,3-Trichloropropane	67	-	68-130				
	2-Hexanone	60	64	70-130				
	n-Butylbenzene	69	-					
	o-Chlorotoluene	68	-					
	p-Chlorotoluene	65	-					
	1,2-Dibromo-3-chloropropane	63	-	68-130				
	Hexachlorobutadiene	61	-	67-130				
	Naphthalene	46	56	70-130				
	1,2,3-Trichlorobenzene	45	54					
	1,2,4-Trichlorobenzene	52	62					
	1,2,4-Trimethylbenzene	68	-					
	1,2,4,5-Tetramethylbenzene	61	-					
	trans-1,4-Dichloro-2-butene	61	67					

LDC #: 60951J

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 20 std)	Recalculated RRF (RRF 20 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA104	04/10/24	Chloroform (FBZ)	0.537	0.537	0.494	0.494	8.79	8.76
			Ethylbenzene (CBZ)	1.797	1.797	1.633	1.633	8.34	8.34
			Naphthalene (DCB)	2.143	2.143	2.010	2.010	5.78	5.79

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V04240703A01.D	07/03/24	Chloroform	(FBZ)	0.494	0.428	0.428	13.4	13.4
			Ethylbenzene	(CBZ)	1.633	1.521	1.521	6.9	6.9
			Naphthalene	(DCB)	2.010	1.670	1.670	16.9	16.9

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	20.79	104	104	0
1,2-Dichloroethane-d4	20.0	19.94	100	100	0
Toluene-d8	20.0	19.20	96	96	0
4-Bromofluorobenzene	20.0	18.24	91	91	0

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3___

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	100.0	100.0	0	91.7	97.1	92	92	97	97	15	6
Benzene	100.0	100.0	0	87.5	93.6	88	87	94	94	15	7
Trichloroethene	100.0	100.0	0	77.9	84.6	78	78	84	85	17	8
Toluene	100.0	100.0	0	83.4	91.3	83	83	91	91	18	9
Chlorobenzene	100.0	100.0	0	76.6	85.3	76	77	86	85	20	11

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1943498-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	39.500	38.201	99	99	96	96	3	3
Benzene	40.00	40.00	38.198	39.063	96	95	98	98	2	2
Trichloroethene	40.00	40.00	35.713	37.114	89	89	93	93	4	4
Toluene	40.00	40.00	37.172	37.590	93	93	94	94	1	1
Chlorobenzene	40.00	40.00	37.486	38.085	90	94	95	95	1	2

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
LCS	TCE	168015	315036	20.0	0.299	1.0	5.00	5.00	na	35.7	36	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVC
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_06282024 (same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12_0.2-2	L2437014-14		Soil	06/28/2024	Category B
2	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
3	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B

Notes:

WG1943524-1 Blk		

LDC#: 60951J

VALIDATION FINDINGS CHECKLIST

Method: SVOA (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 5.0 std)	Recalculated RRF (RRF 5.0 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL MS5	6/30-7/01/24	Phenol (DCB)	1.440	1.440	1.403	1.403	3.86	3.87
			Naphthalene (NPT)	1.040	1.040	1.037	1.037	9.12	9.12
			Diethylphthalate (ANT)	1.409	1.409	1.367	1.367	4.03	4.03
			Pyrene (PHN)	1.322	1.322	1.271	1.271	8.64	8.64
			Chrysene (CRY)	1.202	1.202	1.200	1.200	8.90	8.89
			Benzo(g,h,i)perylene (PRY)	1.083	1.083	1.048	1.048	3.20	3.19

LDC#: 60951J

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0707 MS5	07/07/24 12:38	Phenol (DCB)	1.403	1.392	1.392	0.8	0.8
			Naphthalene (NPT)	1.037	1.017	1.017	1.9	1.9
			Diethylphthalate (ANT)	1.367	1.355	1.355	0.9	0.9
			Pyrene (PHN)	1.271	1.291	1.291	1.6	1.6
			Chrysene (CRY)	1.200	1.197	1.197	0.2	0.2
			Benzo(g,h,i)perylene (PRY)	1.048	1.025	1.025	2.2	2.2

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	20.655	83	83	0
2-Fluorobiphenyl	25.000	17.807	71	71	0
Terphenyl-d14	25.000	16.641	67	67	0
Phenol-d5	50.000	40.516	81	81	0
2-Fluorophenol	50.000	40.646	81	81	0
2,4,6-Tribromophenol	50.000	43.479	87	87	0

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (on col) (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.00	40.00	0	30.507	29.213	79	76	71	73	9	4
N-Nitroso-di-n-propylamine	40.00	40.00	0	30.198	29.225	79	75	71	73	9	3
4-Chloro-3-methylphenol	40.00	40.00	0	32.186	30.401	79	80	78	76	0	6
Acenaphthene	40.00	40.00	0	28.639	27.033	72	72	65	68	10	6
Pentachlorophenol	40.00	40.00	0	34.099	32.452	85	85	78	81	8	5
Pyrene	40.00	40.00	0	31.800	30.600	79	80	78	77	0	4

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1943524-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	33.548	30.076	84	84	75	75	11	11
N-Nitroso-di-n-propylamine	40.0	40.0	32.640	29.106	82	82	73	73	12	11
4-Chloro-3-methylphenol	40.0	40.0	33.730	31.043	84	84	78	78	7	8
Acenaphthene	40.0	40.0	32.502	29.292	81	81	73	73	10	10
Pentachlorophenol	40.0	40.0	32.848	30.734	82	82	77	77	6	7
Pyrene	40.0	40.0	36.100	33.204	90	90	83	83	8	8

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Pyrene	87066	1644993	40.0	1.271	1.00	1000.0	30.05	0.854	65	65	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20 % r² ICV ≤ 20%
IV	Continuing Calibration	SW	CV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-06282024 (same SDG)
VII	Surrogate Spikes / IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results < RL > MDL = J det
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I11_0-0.2	L2437014-09		Soil	06/28/2024	Category B
2	I12_0.2-2	L2437014-14		Soil	06/28/2024	Category B
3	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
4	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B

Notes:

WG1943356-1 BLK		
WG1943481-		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/6/2024	wg1943768-1	CLP1	Methoxychlor	24.8	1, MB1 (ND)	J/UJ/A
		wg1943768-3	CLP1	Toxaphene	60.4		
			CLP2	Toxaphene	31.3		

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	Dieldrin	-	165	30-150			2 (DET)	J det/A
	Delta-BHC	166	218				(ND)	

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Dieldrin	44.0	J det/A
		cis-Chlordane	161	
	2	cis-Chlordane	122	
		Chlordane	45.0	

Comments:_____

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36
2	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1943768-1 PEST20	07/06/24	Dieldrin (CLP1)	1.268	1.491	1.491	17.6	17.6
			Dieldrin (CLP2)	1.203	1.299	1.299	8.0	8.0
			4,4'-DDT (CLP1)	1.112	1.251	1.251	12.5	12.5
			4,4'-DDT (CLP2)	1.087	1.073	1.073	1.3	1.3
2	WG1944019-1 PEST18	07/07/24	Dieldrin (CLP1)	1.294	1.433	1.433	10.7	10.7
			Dieldrin (CLP2)	1.124	1.276	1.276	13.5	13.5
			4,4'-DDD (CLP1)	1.056	1.207	1.207	14.3	14.3
			4,4'-DDD (CLP2)	0.929	1.060	1.060	14.1	14.1

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	25.61	51	51	0
Tetrachloro-m- xylene	CLP2	50.0	26.97	54	54	0
Decachlorobiphenyl	CLP1	50.0	32.48	65	65	0
Decachlorobiphenyl	CLP2	50.0	35.62	71	71	0

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: __3/4___

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	37.7	37.5	0	15.5	19.5	41	41	52	52	23	23
DDT	37.7	37.5	15.6	33.4	43.1	47	47	73	73	25	25

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1943356-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.0	31.9	20.6	19.8	64	64	62	62	3	4
DDT	32.0	31.9	25.4	23.5	80	79	74	74	8	8

LDC # 60951J

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDT	166500000	44946612	25.000	1.112	10.00	15.54	1.00	0.739	72.5	72.6	0
	CLP1											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≥ 70
III	Continuing Calibration	A	CCV ≥ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-06282024 (same SDG)
VI	Surrogate Spikes /LS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	results < RL > MDL = J dets
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12_0.2-2	L2437014-14		Soil	06/28/2024	Category B
2	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
3	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B

Notes:

WG1943504-1 Blks		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (1000 std)	Recalculated CF (1000 std)	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST23	8/25/2023	1260-3 (CLP1)	0.064	0.064	0.062	0.062	15.45	15.27
			1260-3 (CLP2)	0.056	0.056	0.055	0.055	12.62	12.78

LDC# 60951J

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	(Initial CF)	Reported CF (CCV)	Recalculated CF (CCV)	Reported % D	Recalculated %D
1	WG1943313-3	07/06/24	1260-3 (CLP1)	0.062	0.047	0.047	24.2	23.8
			1260-3 (CLP2)	0.055	0.051	0.051	7.3	7.3

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG__

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	366.863	73	73	0
Tetrachloro-m- xylene	RTX-CLP2	500	403.410	81	81	0
Decachlorobiphenyl	RTX-CLP1	500	334.478	67	67	0
Decachlorobiphenyl	RTX-CLP2	500	368.938	74	74	0

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	356	356	15.2	291	292	82	77	82	78	0	0

Note: Parent conc not used in the lab calculation for %R.

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer:__JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: __WG1943504-2,3 LCS/D__

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	297	287	218	220	73	73	77	77	5	1

Lab RPD based on %R

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer:_JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
1	1260-3	5.012E+07	7.618E+08	250	0.062	5.00	10.50	1.00	0.854	**265.27**	265.24	0
	CLP1											
											Reported	
	1260-Total =	(63.93+265.241+79.472)						conc =	(136.21)(5mL)		**final conc**	
		3							(10.5g)(5mL)			
	=	136.21						=	**15.2**		**15.2**	
	clean-up vol = 5 mL											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06282024 (same SDG)
VI	Surrogate Spikes/LS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I11_0-0.2	L2437014-09		Soil	06/28/2024	Category B
2	I12_0.2-2	L2437014-14		Soil	06/28/2024	Category B
3	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
4	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B

Notes:

WG1943026-1 Blk		
WG1943793-1		

Method: GC Herbicides (EPA SW 846 Method 8151A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			√	
Were the RT windows properly established?	√			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
V. Field Blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.188 std)	Recalculated CF (0.188 std)	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	04/12/24	2,4-D (STX-CLP1)	0.254	0.254	0.240	0.240	14.63	14.72
	Pest22		2,4-D (STX-CLP2)	0.242	0.242	0.237	0.237	11.43	11.46

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	(Initial CF)	Reported CF (CCV)	Recalculated CF (CCV)	Reported % D	Recalculated %D
1	WG1943750-1	7/6/2024	2,4-D (STX-CLP1)	0.240	0.239	0.239	0	0.3
	Pest22		2,4-D (STX-CLP2)	0.237	0.241	0.241	1.7	1.7
2	WG1943750-2	7/6/2024	2,4-D (STX-CLP1)	0.240	0.258	0.258	7.5	7.5
	Pest22		2,4-D (STX-CLP2)	0.237	0.240	0.240	1.3	1.3

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: _1____

	Surrogate Spiked	Surrogate	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
BB (1C)	0.500	0.484	97	97	0
BB (2C)	0.500	0.407	81	81	0

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DCAA)	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic acid	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	194	192	0	183	185	94	94	96	96	1	1

LDC#: 60951J

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1943026-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	162.0	166.0	131.0	138.0	81	81	83	83	2	5

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Method: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (uL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	2,4-D	367700000	946400000	0.250	0.2400	10000	30.87	1.00	NA	131.1	131.0	0
WG1943026	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2437014
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I11_0-0.2	L2437014-09	Metals, Wet Chemistry
I12_0.2-2	L2437014-14	Metals, Wet Chemistry
I12_0.2-2MS	L2437014-14MS	Metals, Wet Chemistry
I12_0.2-2MSD	L2437014-14MSD	Metals, Wet Chemistry
I12_0.2-2DUP	L2437014-14DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB_06282024_1, FB_06282024_2
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 28, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	1.45 mg/Kg	7.250 mg/Kg	I11_0-0.2 I12_0.2-2
ICB/CCB	Selenium	0.1268 mg/L	0.634 mg/Kg	I11_0-0.2 I12_0.2-2

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
I12_0.2-2	Selenium	0.391 mg/Kg	1.79U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

Contamination was detected in the field blank samples FB_06282024_1 and FB_06282024_2 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06282024_1	Nickel	0.00184 mg/L	0.0092 mg/Kg	I11_0-0.2 I12_0.2-2
FB_06282024_2	Aluminum Barium	0.00414 mg/L 0.00017 mg/L	0.0207 mg/Kg 0.00085 mg/Kg	I11_0-0.2 I12_0.2-2

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank samples FB_06282024_1 and FB_06282024_2 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. For I12_0.2-2MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration. Relative percent differences (RPD) were within QC limits.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits with the following exceptions:

Diluted Sample	Analyte	%D (≤10)	Associated Samples	Validation Action
I12_0.2-2	Iron	23	I11_0-0.2 I12_0.2-2	J (all detects)

LCS Results

Metals

All criteria were met.

Wet Chemistry

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
WG1944191-2 (I11_0-0.2 I12_0.2-2)	Hexavalent chromium	79 (80-120)	UJ (all non-detects)

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1944462-2 (I12_0.2-2)	Cyanide	74 (80-120)	-	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I11_0-0.2 I12_0.2-2	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06282024_1 and FB_06282024_2
VII	Matrix Spike/Matrix Spike Duplicate	SW	MS/MSD (3, 4): Several analytes >4X spike amount, %R
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	SW	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I11_0-0.2 2X, 6010D, matrix	L2437014-09		Soil	06/28/2024	Category B
2	I12_0.2-2 2X, 6010D, matrix	L2437014-14		Soil	06/28/2024	Category B
3	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
4	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1, 2	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg
QC			
3, 4	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?		NO		
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	2				
Iron	1.45		7.250					
Selenium		0.1268	0.634	0.391/1.79U				

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Sampling Date: 06/28/24

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06282024_1							
Nickel	0.00184	0.0092						

Blank units: mg/L
Sampling Date: 06/28/24

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06282024_2							
Aluminum	0.00414	0.0207						
Barium	0.00017	0.00085						

Comments: The action level, when applicable, is established at 5X the highest concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Serial dilution analysis was performed by the laboratory. All serial dilution percent differences (%D) were within 10%D with the following exceptions:

Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualification	Det/ND
2	Soil	Iron	23	All	Jdet/A	Det

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1850101-1 ICV	ICP	Pb	0.5008	0.500	100.16	100	Y
R1850101-18 CCV	ICP	Mn	0.4845	0.5000	96.9	97	Y
R1850101-3 ICSA	ICP	Ca	467.3617	500	93.47234	93	Y
R1850431-1 ICV	CVAA	Hg	0.003019	0.00300	100.6333333	101	Y
R1850431-5 CCV	CVAA	Hg	0.010072	0.0100	100.72	101	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1942477-2	LCS	Hg	1.66316667	1.7	99.59081856	100	Y
3	MS	V	44.6473472	45.4	98.34217445	98	Y
3, 4	MS/MSD RPD	Hg	2.13736918	2.33007137	8.626961583	9	Y
2	Serial dilution	Al	9191.3571	9778.54708	6.388501433	6	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Hg (ug/L)	0.697	1	0.345	50	73.9	0.137	0.136690789	Y
2	Mg	23.6908	2	1.308	50	85.4	2120.00	2120.870306	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951J
SDG #: L2437014
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A); Cyanide (EPA 9010C/9012B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB_06282024_1 and FB_06282024_2
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	SW	LCS/LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I11_0-0.2	L2437014-09		Soil	06/28/2024	Category B
2	I12_0.2-2	L2437014-14		Soil	06/28/2024	Category B
3	I12_0.2-2MS	L2437014-14MS	MS	Soil	06/28/2024	Category B
4	I12_0.2-2MSD	L2437014-14MSD	MSD	Soil	06/28/2024	Category B
5	I12_0.2-2DUP	L2437014-14DUP	DUP	Soil	06/28/2024	Category B

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1, 2	Cr(VI)
2	Cyanide
QC	
3, 4	Cr(VI), Cyanide
5	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	Yes			
II/III Calibration				
Were all instruments calibrated at the required frequency?	Yes			
Were the proper number of standards used?	Yes			
Were all initial and continuing calibration verifications within the QC limits?	Yes			
Were all initial calibration correlation coefficients within limits as specifed by the method?	Yes			
Were balance checks performed as required?			NA	
IV Blanks				
Was a method blank associated with every sample in this SDG?	Yes			
Was there contamination in the method blanks?		No		
Was there contamination in the initial and continuing calibration blanks?		No		
V. Field Blanks				
Were field blanks identified in this SDG?	Yes			
Were target analytes detected in the field blanks?		No		
VI. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	Yes			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	Yes			

VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	Yes			
Were the LCS recoveries and RPDs (if applicable) within QC limits?		No		
IX. Field Duplicates				
Were field duplicates identifed in this SDG?		No		
Were target analytes detected in the field duplicates?			NA	
X. Sample Result Verification				
Were all reporting limits adjusted to reflect sample dilutions?	Yes			
Were all soil samples dry weight corrected?	Yes			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	Yes			

METHOD: Inorganics

A LCS was analzyed for each matrix at the required frequencies. All LCS percent recoveries (%R) were within the acceptable limits with the following exceptions.

LCS ID	Matrix	Analyte	LCS %R	%R Limit	Associated Samples	Qualification	Det/ND
WG1944191-2	Soil	Cr(VI)	79	80-120	All	J/UJ/A	ND

Comments:

METHOD: Inorganics

A LCS/LCSD was analzyed for each matrix at the required frequencies. All LCS/LCSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

LCS/LCSD ID	Matrix	Analyte	LCS %R	LCSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
WG1944462-2	Soil	Cyanide	74		80-120			2	J/UJ/A	ND

Comments:

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date: 3/6/2024
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			
		s6					
		s7					
		s8					
		s9					
		s10					
		s11					
		s12					

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.205	0.2		102.5	103	Y
Calibration verification	Cyanide	5.37998	5.00		107.5996	108	Y
Calibration verification	Cyanide	5.50093	5.00		110.0186	110	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1944191-2	LCS	Cr(VI)	151.1	192.0	78.71114688	79	Y
3	MS	Cyanide	11.3332201	11	103.0292736	100	Y
3, 4	MS/MSD RPD	Cr(VI)	1093.46988	1253.6517	13.64921369	14	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/Kg)	Recalculated Result (mg/Kg)	Acceptable (Y/N)
1	Cr(VI)	0.000	1	2.5059	100	73.9	0.216U	0	Y
2	Cyanide	0.06739	1	1.038	50	85.4	0.24U	0.078911007	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2437190
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E10_4-6	L2437190-03	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 19, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/02/24	WG1942267-1	CLP1	Methoxychlor Toxaphene	21.7 68.6	E10_4-6	UJ (all non-detects) UJ (all non-detects)
07/02/24	WG1942267-3	CLP2	Toxaphene	39.7	E10_4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951K
SDG #: L2437190
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [illegible]

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E10_4-6	L2437190-03		Soil	06/18/2024	Category B

Notes:

WG1941954-1 BLANK		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951K

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/2/2024	WG1942267-1	CLP1	Methoxychlor	21.7	ALL (ND)	J/UJ/A
		WG1942267-3	CLP1	Toxaphene	68.6	↓	↓
		↓	CLP2	Toxaphene	39.7	↓	↓

LDC# 60951K

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951K

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942267-1	07/02/24	Dieldrin (CLP1)	1.268	1.450	1.450	14.4	14.4
			Dieldrin (CLP2)	1.203	1.255	1.255	4.3	4.3
			4,4'-DDT (CLP1)	1.112	1.231	1.231	10.7	10.7
			4,4'-DDT (CLP2)	1.087	1.043	1.043	4.0	4.0

LDC # 60951K

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:__JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	36.20	72	72	0
Tetrachloro-m- xylene	CLP2	50.0	36.65	73	73	0
Decachlorobiphenyl	CLP1	50.0	44.76	90	90	0
Decachlorobiphenyl	CLP2	50.0	55.73	111	111	0

LDC # 60951K

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1941954-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.8	32.6	26.5	24.1	81	81	74	74	9	9
DDT	32.8	32.6	33.7	31.4	103	103	96	96	7	7

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	4,4'-DDE	1883567	44075089	25.000	1.3120	10.00	15.60	1.00	0.920	0.57	0.57	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2437190
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
E3_4-6	L2437190-01	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 18, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Arsenic	0.086 mg/Kg	0.430 mg/Kg	E3_4-6
	Iron	1.74 mg/Kg	8.700 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
E3 4-6	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951K
SDG #: L2437190
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	E3_4-6 2X, 6010D, matrix	L2437190-01		Soil	06/18/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Arsenic	0.086		0.430					
Iron	1.74		8.700					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1850488-3 ICV	ICP	Ba	0.5038	0.500	100.76	101	Y
R1850488-18 CCV	ICP	Ag	0.4995	0.5000	99.9	100	Y
R1850488-5 ICSA	ICP	Mg	486.9285	500	97.3857	97	Y
R1850335-1 ICV	CVAA	Hg	0.002972	0.00300	99.06666667	99	Y
R1850335-19 CCV	CVAA	Hg	0.009977	0.0100	99.77	100	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1942664-2	LCS	Hg	1.65083333	1.7	98.85229521	99	Y
WG1942659-2	LCS	Cd	3.9760000	4.24	93.77358491	94	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cu	0.3642	2	1.275	50	90	31.7	31.73856209	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2437361
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F11_2-4	L2437361-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 20, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/03/24	WG1942719-3	CLP1	Toxaphene	40.1	F11_2-4	UJ (all non-detects)
07/03/24	WG1942719-3	CLP2	Toxaphene	51.2	F11_2-4	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
F11_2-4	cis-Chlordane trans-Chlordane	91.5 55.6	J (all detects) J (all detects)
F11_2-4	4,4'-DDE	200	NJ (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951L
SDG #: L2437361
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≥ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /5	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F11_2-4	L2437361-01		Soil	06/20/2024	Category B

Notes:

WG1942334-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951L

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/3/2024	WG1942719-3	CLP1	Toxaphene	40.1	ALL (ND)	J/UJ/A
			CLP2	Toxaphene	51.2		

LDC#: 60951H

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	cis-Chlordane	91.5	J det/A
		trans-Chlordane	55.6	J det/A
		4,4'-DDE	200	NJ/A

Comments: 4,4'-DDE reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL

LDC# 60951L

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10

LDC# 60951L

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942719-1 PEST18	07/03/25	Dieldrin (CLP1)	1.294	1.345	1.345	3.9	3.9
			Dieldrin (CLP2)	1.124	1.242	1.242	10.5	10.5
			4,4'-DDD (CLP1)	1.056	1.121	1.121	6.2	6.2
			4,4'-DDD (CLP2)	0.929	1.006	1.006	8.3	8.3

LDC # 60951L

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	31.29	63	63	0
Tetrachloro-m- xylene	CLP2	50.0	33.63	67	67	0
Decachlorobiphenyl	CLP1	50.0	33.04	66	66	0
Decachlorobiphenyl	CLP2	50.0	47.33	95	95	0

LDC # 60951L

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1942339-2,3 LCS/D

Compound	SA		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.5	32.7	23.6	24.5	75	75	75	75	0	4
DDT	31.5	32.7	26.1	28.2	83	83	86	86	4	8

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	27668678	530400000	25.000	1.2940	10.00	15.55	1.00	0.897	0.723	0.723	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2437361
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F11_2-4	L2437361-01	Metals
F11_2-4MS	L2437361-01MS	Metals
F11_2-4DUP	L2437361-01DUP	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 20, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.632 mg/Kg	3.160 mg/Kg	F11 2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (75-125)	Validation Action
F11_2-4MS (F11_2-4)	Antimony	74	J (all detects)
	Arsenic	72	UJ (all non-detects)
	Calcium	50	
	Potassium	72	
	Selenium	67	

For F11_2-4MS, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Laboratory Duplicate Results

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (≤20)	Difference (≤3.60)	Validation Action
F11_2-4DUP (F11_2-4)	Calcium	27	-	J (all detects)

Serial Dilution

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
F11_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951L
SDG #: L2437361
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	SW	MS (2): Several analytes > 4X spike amount, %R
VIII	Laboratory Duplicate	SW	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F11_2-4 2X, 6010D, matrix	L2437361-01		Soil	06/20/2024	Category B
2	F11_2-4MS	L2437361-01MS	MS	Soil	06/20/2024	Category B
3	F11_2-4DUP	L2437361-01DUP	DUP	Soil	06/20/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg
QC			
2, 3	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.632		3.160					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
2	Soil	Antimony	74	75-125	All	J/UJ/A	ND PDS = 74%
		Arsenic	72			↓	Det PDS = 75%
		Calcium	50			↓	Det PDS = 88%
		Potassium	72			↓	Det PDS = 88%
		Selenium	67			↓	ND PDS = 72%

Comments: MS (2): Several analytes > 4X spike amount, %R

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Laboratory duplicate analysis was performed by the laboratory. All laboratory duplicates were with the relative percent difference (RPD) for samples >5X the reporting limits with the exceptions listed below. If samples were <5X the reporting limits, the difference was within 1X the reporting limit for water samples and within 2X the reporting limit for soil samples for all samples with the exceptions listed below.

Duplicate ID	Matrix	Analyte	RPD	RPD Limit	Difference (mg/Kg)	Difference Limit (2X RL)	Associated Samples	Qualification	Det/ND
3	Soil	Calcium	27	20			All	J/UJ/A	Det

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1848440-3 ICV	ICP	Co	0.4729	0.500	94.58	95	Y
R1848440-22 CCV	ICP	K	5.2500	5.0000	105	105	Y
R1848440-5 ICSA	ICP	Al	492.1790	500	98.4358	98	Y
R1848914-1 ICV	CVAA	Hg	0.003138	0.00300	104.6	105	Y
R1848914-5 CCV	CVAA	Hg	0.009892	0.0100	98.92	99	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1942643-2	LCS	Hg	1.75766667	1.7	105.2495012	106	Y
2	MS	Tl	9.20147119	10.5	87.63305895	88	Y
3	Laboratory Duplicate	Cr	20.8211658	17.785583	15.72565883	16	Y
1	PDS	Sb	32.4670506	43.6	74.46571239	74	Y
1	Serial dilution	Fe	17021.2207	18331.5742	7.698352093	8	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Be	0.0054	2	1.277	50	89.7	0.475	0.471422623	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2437366
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C11_4-6	L2437366-02	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	None Associated
Field Duplicate pair:	None Associated

The above-listed soil sample was collected on June 14, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/03/24	WG1942729-3	CLP1	Toxaphene	46.8	C11 4-6	UJ (all non-detects)
07/03/24	WG1942729-3	CLP2	Toxaphene	21.8	C11 4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
C11_4-6	cis-Chlordane	82.0	J (all detects)
	trans-Chlordane	48.6	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951M
SDG #: L2437366
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: 2V6
2nd Reviewer: Q

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD≤ 20% ✓ ICV≤ 20%
IV	Continuing Calibration	SW	CCV≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes / LS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results <RL→ NQ= J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C11_4-6	L2437366-02		Soil	06/14/2024	Category B

Notes:

WG1942339-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		✓		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/3/2024	WG1942729-3	CLP1	Toxaphene	46.8	ALL (ND)	J/UJ/A
	7:07		CLP2	Toxaphene	21.8		

LDC#: 60951M

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	cis-Chlordane	82.0	J det/A
		trans-Chlordane	48.6	J det/A

Comments:___4,4'-DDE reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL_____

LDC# 60951M

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951M

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942729-1	07/03/24	Dieldrin (CLP1)	1.268	1.348	1.348	6.3	6.3
			Dieldrin (CLP2)	1.203	1.189	1.189	1.2	1.2
			4,4'-DDT (CLP1)	1.112	1.090	1.090	2.0	2.0
			4,4'-DDT (CLP2)	1.087	0.947	0.947	12.9	12.9

LDC # 60951M

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	28.01	56	56	0
Tetrachloro-m- xylene	CLP2	50.0	29.00	58	58	0
Decachlorobiphenyl	CLP1	50.0	26.08	52	52	0
Decachlorobiphenyl	CLP2	50.0	33.13	66	66	0

LDC # 60951M

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1942339-2,3 LCS/D_

Compound	SA		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.5	32.7	23.6	24.5	75	75	75	75	0	4
DDT	31.5	32.7	26.1	28.2	83	83	86	86	4	8

LDC # 60951M

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDE	8606967	54998960	25.000	1.3120	10.00	15.65	1.00	0.884	2.155	2.150	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2437366
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
C11_4-6	L2437366-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 14, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	1.9 mg/Kg	9.500 mg/Kg	C11 4-6

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
C11 4-6	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951M
SDG #: L2437366
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	C11_4-6 2X, 6010D, matrix	L2437366-02		Soil	06/14/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	1.9		9.500					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1850488-3 ICV	ICP	Mg	0.5052	0.500	101.04	101	Y
R1850488-30 CCV	ICP	As	0.4602	0.5000	92.04	92	Y
R1850488-5 ICSA	ICP	Ca	478.0687	500	95.61374	96	Y
R1850335-1 ICV	CVAA	Hg	0.002972	0.00300	99.06666667	99	Y
R1850335-31 CCV	CVAA	Hg	0.010080	0.0100	100.8	101	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1943167-2	LCS	Hg	1.6595	1.67	99.37125749	100	Y
WG1943164-2	LCS	Na	819.616	800	102.452	102	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Fe	241.3787	2	1.314	50	88.4	20800	20780.27611	Y
1	Hg (ug/L)	1.373	1	0.353	50	88.4	0.220	0.219995385	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2437374
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G4_2-4	L2437374-06	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	None Associated
Field Duplicate pair:	None Associated

The above-listed soil sample was collected on June 21, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/03/24	WG1942719-3	CLP1	Toxaphene	40.1	G4 2-4	UJ (all non-detects)
07/03/24	WG1942719-3	CLP2	Toxaphene	51.2	G4 2-4	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
G4 2-4	Dieldrin	41.0	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951N
SDG #: L2437374
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: QVG
2nd Reviewer: [signature]

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD≤ 20% and ICV≤ 20%
IV	Continuing Calibration	SW	CCV≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes/ IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	no results <RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G4_2-4	L2437374-06		Soil	06/21/2024	Category B

Notes:

WG1942394-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/3/2024	WG1942719-3	CLP1	Toxaphene	40.1	ALL (ND)	J/UJ/A
			CLP2	Toxaphene	51.2	↓	↓

LDC#: 60951N

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Dieldrin	41.0	J det/A
		~~4,4'-DDE~~	~~203~~	~~NF/A~~

Comments: ~~4,4'-DDE reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL~~

LDC# 60951N

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10

LDC# 60951N

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1942719-1 PEST18	07/03/25	Dieldrin (CLP1)	1.294	1.345	1.345	3.9	3.9
			Dieldrin (CLP2)	1.124	1.242	1.242	10.5	10.5
			4,4'-DDD (CLP1)	1.056	1.121	1.121	6.2	6.2
			4,4'-DDD (CLP2)	0.929	1.006	1.006	8.3	8.3

LDC # 60951N

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:__JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	19.64	39	39	0
Tetrachloro-m- xylene	CLP2	50.0	30.09	60	60	0
Decachlorobiphenyl	CLP1	50.0	18.51	37	37	0
Decachlorobiphenyl	CLP2	50.0	37.85	76	76	0

LDC # 60951N

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1942339-2,3 LCS/D_

Compound	SA		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.5	32.7	23.6	24.5	75	75	75	75	0	4
DDT	31.5	32.7	26.1	28.2	83	83	86	86	4	8

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDE	3486900000	223700000	25.000	1.1570	10.00	15.85	1.00	0.786	270.4	270.0	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2437374
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G4_2-4	L2437374-06	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 21, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.632 mg/Kg	3.160 mg/Kg	G4 2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (75-125)	Validation Action
F11_2-4MS (G4_2-4)	Antimony	74	J (all detects)
	Arsenic	72	UJ (all non-detects)
	Calcium	50	
	Potassium	72	
	Selenium	67	

For F11_2-4MS, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Laboratory Duplicate Results

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (≤20)	Difference (≤3.60)	Validation Action
F11_2-4DUP (G4_2-4)	Calcium	27	-	J (all detects)

Serial Dilution

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
G4_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951N
SDG #: L2437374
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	SW	F11_2-4MS (SDG L2437361): Several analytes > 4X spike amount, %R
VIII	Laboratory Duplicate	SW	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G4_2-4 2X, 6010D, matrix	L2437374-06		Soil	06/21/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		NO		
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.632		3.160					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
F11_2-4	Soil	Antimony	74	75-125	All	J/UJ/A	ND PDS = 74%
		Arsenic	72			↓	Det PDS = 75%
		Calcium	50			↓	Det PDS = 88%
		Potassium	72			↓	Det PDS = 88%
		Selenium	67			↓	ND PDS = 72%

Comments: F11_2-4MS: Several analytes > 4X spike amount, %R

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Laboratory duplicate analysis was performed by the laboratory. All laboratory duplicates were with the relative percent difference (RPD) for samples >5X the reporting limits with the exceptions listed below. If samples were <5X the reporting limits, the difference was within 1X the reporting limit for water samples and within 2X the reporting limit for soil samples for all samples with the exceptions listed below.

Duplicate ID	Matrix	Analyte	RPD	RPD Limit	Difference (mg/Kg)	Difference Limit (2X RL)	Associated Samples	Qualification	Det/ND
F11_2-4DUP	Soil	Calcium	27	20			All	J/UJ/A	Det

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1848440-3 ICV	ICP	Be	0.5003	0.500	100.06	100	Y
R1848440-24 CCV	ICP	Na	10.0798	10.0000	100.798	101	Y
R1848440-5 ICSA	ICP	Fe	175.5126	200	87.7563	88	Y
R1848914-1 ICV	CVAA	Hg	0.003138	0.00300	104.6	105	Y
R1848914-5 CCV	CVAA	Hg	0.009892	0.0100	98.92	99	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1942643-2	LCS	Hg	1.75766667	1.67	105.2495012	106	Y
WG1942302-2	LCS	Ba	159.968	160	99.98	100	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cu	0.2014	2	1.259	50	78.6	20.4	20.35219195	Y
1	Hg (ug/L)	9.975	1	0.399	50	78.6	1.590	1.590330789	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2437556
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
F13_4-6	L2437556-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 19, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/05/24	WG1943339-3	CLP1	Toxaphene	38.0	F13 4-6	UJ (all non-detects)
07/05/24	WG1943339-3	CLP2	Toxaphene	39.8	F13 4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
F13_4-6	cis-Chlordane	54	J (all detects)
	trans-Chlordane	198	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951O
SDG #: L2437556
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SV6
2nd Reviewer: CL

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% rr ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /12	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results <RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F13_4-6	L2437556-01		Soil	06/19/2024	Category B

Notes:

WG1942339 - 1 Rplc		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951O

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
P11	7/5/2024	WG1943339-3	CLP1	Toxaphene	38.0	ALL (ND)	J/UJ/A
			CLP2	Toxaphene	39.8	↓	↓

LDC#: 60951O

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	cis-Chlordane	54	J det/A
		trans-Chlordane	198	

Comments: ~~4,4'-DDE reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL~~ N/A

LDC#: 60951O

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	6/25/2024	Dieldrin (CLP1)	1.346	1.347	1.418	1.418	5.52	5.52
			Dieldrin (CLP2)	1.209	1.209	1.286	1.286	5.05	5.06
			4,4'-DDD (CLP1)	1.092	1.092	1.114	1.115	5.64	5.64
			4,4'-DDD (CLP2)	0.980	0.980	1.025	1.025	5.90	5.91

LDC# 60951O

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1941361-1 PEST11	07/05/24	Dieldrin (CLP1)	1.418	1.507	1.507	6.3	6.3
			Dieldrin (CLP2)	1.286	1.339	1.339	4.1	4.1
			4,4'-DDD (CLP1)	1.114	1.216	1.216	9.2	9.2
			4,4'-DDD (CLP2)	1.025	1.057	1.057	3.1	3.1

LDC # 60951O

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:__JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	23.31	47	47	0
Tetrachloro-m- xylene	CLP2	50.0	30.65	61	61	0
Decachlorobiphenyl	CLP1	50.0	19.85	40	40	0
Decachlorobiphenyl	CLP2	50.0	35.29	71	71	0

LDC # 60951O

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1942339-2,3 LCS/D_

Compound	SA		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.5	32.7	23.6	24.5	75	75	75	75	0	4
DDT	31.5	32.7	26.1	28.2	83	83	86	86	4	8

LDC # 60951O

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	155100000	145500000	25.000	1.2860	10.00	15.50	1.00	0.860	15.5	15.5	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2438026
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H13_2-4	L2438026-03	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 25, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951P
SDG #: L2438026
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H13_2-4	L2438026-03		Soil	06/25/2024	Category B

Notes:

WG 1943642 - 1 blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951P

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	6/25/2024	Dieldrin (CLP1)	1.346	1.347	1.418	1.418	5.52	5.52
			Dieldrin (CLP2)	1.209	1.209	1.286	1.286	5.05	5.06
			4,4'-DDD (CLP1)	1.092	1.092	1.114	1.115	5.64	5.64
			4,4'-DDD (CLP2)	0.980	0.980	1.025	1.025	5.90	5.91

LDC# 60951P

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1943783-1 PEST11	07/06/24	Dieldrin (CLP1)	1.418	1.609	1.609	13.5	13.5
			Dieldrin (CLP2)	1.286	1.451	1.451	12.8	12.8
			4,4'-DDD (CLP1)	1.114	1.287	1.287	15.5	15.5
			4,4'-DDD (CLP2)	1.025	1.152	1.152	12.4	12.4

LDC # 60951P

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	27.62	55	55	0
Tetrachloro-m- xylene	CLP2	50.0	32.54	65	65	0
Decachlorobiphenyl	CLP1	50.0	36.77	74	74	0
Decachlorobiphenyl	CLP2	50.0	37.99	76	76	0

LDC # 60951P

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1943642-2,3 LCS/D

Compound	SA		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.7	31.4	25.4	26.3	78	78	84	84	7	3
DDT	32.7	31.4	24.7	27.0	75	75.5	86	86	14	9

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	8084752	167600000	25.000	1.4180	10.00	15.39	1.00	0.934	0.592	0.592	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2438026
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H13_2-4	L2438026-03	Metals

Associated QC Samples(s):

Field/Trip Blanks: FB_06252024
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 25, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.936 mg/Kg	4.680 mg/Kg	H13 2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06252024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06252024	Chromium Sodium	0.00025 mg/L 0.0750 mg/L	0.00125 mg/Kg 0.375 mg/Kg	H13_2-4

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
H13_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951P
SDG #: L2438026
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06252024
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H13_2-4 2X, 6010D, matrix	L2438026-03		Soil	06/25/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.936		4.680					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/25/24
Associated Samples: All samples

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06252024							
Cr	0.00025	0.00125						
Na	0.0750	0.375						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1849942-3 ICV	ICP	Tl	0.5007	0.500	100.14	100	Y
R1849942-8 CCV	ICP	As	0.4942	0.5000	98.84	99	Y
R1849942-5 ICSA	ICP	Mg	469.4937	500	93.89874	94	Y
R1849967-1 ICV	CVAA	Hg	0.002996	0.00300	99.86666667	100	Y
R1849967-11 CCV	CVAA	Hg	0.010160	0.0100	101.6	102	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1943464-2	LCS	Hg	1.637	1.67	98.0239521	98	Y
WG1943463-2	LCS	Ag	4.192	4.00	104.8	105	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Al	53.8911	2	1.280	50	93.4	4510	4507.753948	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2438098
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G4_4-6	L2438098-04	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	None Associated
Field Duplicate pair:	None Associated

The above-listed soil sample was collected on June 21, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/08/24	WG1942729-3	CLP1	Methoxychlor	20.4	G4 4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
G4_4-6	Heptachlor epoxide	95.6	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951Q
SDG #: L2438098
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD≤ 20% r= ICV≤ 20%
IV	Continuing Calibration	SW	CCV≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes / IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results <RL > MDL= J flags
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G4_4-6	L2438098-04		Soil	06/21/2024	Category B

Notes:

WG1943876-1 PBLK		

LDC #: 60951Q

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951Q

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/8/2024	WG1942729-3	CLP1	Methoxychlor	20.4	ALL (ND)	J/UJ/A
	9:54						

LDC#: 60951Q

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Heptachlor Epoxide	95.6	J det/A

Comments: ~~4,4'-DDE reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL~~ – NJ/A

LDC# 60951Q

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951Q

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1944285-1	07/08/24	Dieldrin (CLP1)	1.268	1.389	1.389	9.5	9.5
			Dieldrin (CLP2)	1.203	1.196	1.196	0.6	0.6
			4,4'-DDT (CLP1)	1.112	1.173	1.173	5.5	5.5
			4,4'-DDT (CLP2)	1.087	1.004	1.004	7.6	7.6

LDC # 60951Q

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	36.06	72	72	0
Tetrachloro-m- xylene	CLP2	50.0	40.60	81	81	0
Decachlorobiphenyl	CLP1	50.0	37.68	75	75	0
Decachlorobiphenyl	CLP2	50.0	44.66	89	89	0

LDC # 60951Q

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1943876-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.4	32.7	25.7	27.0	82	82	82	83	0	5
DDT	31.4	32.7	30.0	30.8	96	96	94	94	2	3

LDC # 60951Q

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDT	36709591	103600000	25.000	1.087	10.00	15.25	1.00	0.786	6.796	6.79	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2438098
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
G4_4-6	L2438098-04	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 21, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.958 mg/Kg	4.790 mg/Kg	G4_4-6
	Manganese	0.068 mg/Kg	0.340 mg/Kg	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
G4 4-6	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951Q
SDG #: L2438098
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	G4_4-6 2X, 6010D, matrix	L2438098-04		Soil	06/21/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.958		4.790					
Mn	0.068		0.340					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1851234-3 ICV	ICP	K	5.1792	5.00	103.584	104	Y
R1851696-20 CCV	ICP	As	0.4792	0.5000	95.84	96	Y
R1851234-5 ICSA	ICP	Ca	454.5201	500	90.90402	91	Y
R1851258-1 ICV	CVAA	Hg	0.002964	0.00300	98.8	99	Y
R1851258-25 CCV	CVAA	Hg	0.010097	0.0100	100.97	101	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1944341-2	LCS	Hg	1.60	1.67	95.80838323	96	Y
WG1944339-2	LCS	Ni	38.024	40.0	95.06	95	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cr	0.2261	2	1.273	50	78.6	22.6	22.59693897	Y
1	Hg (ug/L)	4.257	1	0.390	50	78.6	0.694	0.694362889	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2438208
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H5_2-4	L2438208-04	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	None Associated
Field Duplicate pair:	None Associated

The above-listed soil sample was collected on June 26, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/10/24	WG1945034-4	CLP1	Methoxychlor	23.4	H5_2-4	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951R
SDG #: L2438208
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS LCS/D
IX	Laboratory Control Sample	A	
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H5_2-4	L2438208-04		Soil	06/26/2024	Category B

Notes:

WG1944865-1 BLK		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/10/2024	WG1945034-4	CLP1	Methoxychlor	23.4	ALL (ND)	J/UJ/A
	2:52						

LDC# 60951R

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951R

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1945034-4	07/10/24	Dieldrin (CLP1)	1.268	1.486	1.486	17.2	17.2
			Dieldrin (CLP2)	1.203	1.271	1.271	5.6	5.6
			4,4'-DDT (CLP1)	1.112	1.257	1.257	13.0	13.0
			4,4'-DDT (CLP2)	1.087	1.043	1.043	4.0	4.0

LDC # 60951R

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	43.33	87	87	0
Tetrachloro-m- xylene	CLP2	50.0	42.03	84	84	0
Decachlorobiphenyl	CLP1	50.0	56.61	113	113	0
Decachlorobiphenyl	CLP2	50.0	55.69	111	111	0

LDC # 60951R

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1944865-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.8	32.7	30.3	30.6	92	92	94	94	2	1
DDT	32.8	32.7	38.3	37.0	117	117	113	113	3	3

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	DDT	111600000	42917903	25.000	1.112	10.00	15.25	1.00	NA	38.33	38.30	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2438208
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H5_2-4	L2438208-04	Metals
H5_2-4MS	L2438208-04MS	Metals
H5_2-4DUP	L2438208-04DUP	Metals

Associated QC Samples(s):

Field/Trip Blanks: FB_06262024
Field Duplicate pair: None Associated

The above-listed soil samples were collected on June 26, 2024 and were analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron Sodium	0.881 mg/Kg 1.38 mg/Kg	4.405 mg/Kg 6.900 mg/Kg	H5_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB_06262024 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06262024	Barium	0.00018 mg/L	0.0009 mg/Kg	H5_2-4

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

MS/MSD Results

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
H5_2-4MS (H5_2-4)	Antimony	72 (75-125)	UJ (all non-detects)

Laboratory Duplicate Results

All criteria were met.

Serial Dilution

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
H5_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951R
SDG #: L2438208
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06262024
VII	Matrix Spike/Matrix Spike Duplicate	SW	MS (2): Several analytes > 4X spike amount, %R
VIII	Laboratory Duplicate	A	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H5_2-4 2X, 6010D, matrix	L2438208-04		Soil	06/26/2024	Category B
2	H5_2-4MS	L2438208-04MS	MS	Soil	06/26/2024	Category B
3	H5_2-4DUP	L2438208-04DUP	DUP	Soil	06/26/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg
QC			
2, 3	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?		NO		
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		NO		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**					
Iron	0.881		4.405					
Na	1.38		6.900					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 06/26/24
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06262024							
Ba	0.00018	0.0009						

Comments: The action level, when applicable, is estabilised at 5X the highest concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
2	Soil	Sb	72	75-125	All	J/UJ/A	ND PDS = 88%

Comments: MS (2): Several analytes > 4X spike amount, %R

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1850764-3 ICV	ICP	Pb	0.4974	0.500	99.48	99	Y
R1850764-40 CCV	ICP	Se	0.4899	0.5000	97.98	98	Y
R1850764-5 ICSA	ICP	Al	513.7373	500	102.74746	103	Y
R1851255-1 ICV	CVAA	Hg	0.002953	0.00300	98.43333333	98	Y
R1851255-3 CCV	CVAA	Hg	0.010033	0.0100	100.33	100	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1944494-2	LCS	Hg	1.69533333	1.67	101.5169659	102	Y
2	MS	Cd	3.83132189	4.41	86.87804739	87	Y
3	Laboratory Duplicate	Zn	38.469449	41.7898132	8.274095996	8	Y
1	PDS	Sb	36.1412082	41.1	87.93481314	88	Y
1	Serial dilution	Mn	373.258961	415.463468	11.30703115	11	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Mn	4.5370	2	1.307	50	93	373	373.2589613	Y
1	Hg (ug/L)	0.347	1	0.399	50	93	0.047	0.046756677	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2438241
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
H9_4-6	L2438241-01	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 25, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/10/24	WG1945034-4	CLP1	Methoxychlor	23.4	H9_4-6	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951S
SDG #: L2438241
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer:
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes TCX	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	No results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	H9_4-6	L2438241-01		Soil	06/25/2024	Category B

Notes:

WG1944865-1 TCX		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/10/2024	WG1945034-4	CLP1	Methoxychlor	23.4	ALL (ND)	J/UJ/A
	2:52						

LDC# 60951S

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	6/19/2024	Dieldrin (CLP1)	1.053	1.053	1.268	1.268	10.58	10.59
			Dieldrin (CLP2)	1.077	1.077	1.203	1.203	9.60	9.59
			4,4'-DDT (CLP1)	0.860	0.860	1.112	1.111	14.19	14.19
			4,4'-DDT (CLP2)	0.968	0.968	1.087	1.087	11.37	11.36

LDC# 60951S

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1945034-4	07/10/24	Dieldrin (CLP1)	1.268	1.486	1.486	17.2	17.2
			Dieldrin (CLP2)	1.203	1.271	1.271	5.6	5.6
			4,4'-DDT (CLP1)	1.112	1.257	1.257	13.0	13.0
			4,4'-DDT (CLP2)	1.087	1.043	1.043	4.0	4.0

LDC # 60951S

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	46.27	93	93	0
Tetrachloro-m- xylene	CLP2	50.0	45.55	91	91	0
Decachlorobiphenyl	CLP1	50.0	60.08	120	120	0
Decachlorobiphenyl	CLP2	50.0	57.61	115	115	0

LDC # 60951S

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1944865-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.8	32.7	30.3	30.6	92	92	94	94	2	1
DDT	32.8	32.7	38.3	37.0	117	117	113	113	3	3

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDT	13230868	82434023	25.000	1.087	10.00	15.84	1.00	0.860	2.71	2.71	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2439451
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I12_2-4	L2439451-03	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 28, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG1946068-2,3-A LCS/LCSD (I12_2-4)	delta-BHC	31	None
	Lindane	33	
	alpha-BHC	35	
	beta-BHC	31	
	Heptachlor	31	
	Aldrin	34	
	Endrin	34	
	Endrin aldehyde	34	
	Endrin ketone	33	
	4,4'-DDD	34	
	Endosulfan I	35	
	Endosulfan II	35	
	Endosulfan sulfate	33	
	Methoxychlor	33	
	cis-Chlordane	32	
WG1946068-2,3-A LCS/LCSD (I12_2-4)	Heptachlor epoxide	34	J (all detects)
	Dieldrin	35	J (all detects)
	4,4'-DDE	37	J (all detects)
	4,4'-DDT	34	J (all detects)
	trans-Chlordane	33	J (all detects)

No data were qualified due to high %Rs when the associated results were non-detected.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
I12_2-4	Heptachlor epoxide	200	NJ (all detects)
I12_2-4	trans-Chlordane	126	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951T
SDG #: L2439451
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: SY6
2nd Reviewer: [signature]

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20%, r² ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes /LS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results <RL > MDL = J Acts
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12_2-4	L2439451-03		Soil	06/28/2024	Category B

Notes:

WG1946068-1 BLK		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. trans–Heptachlor epoxide
B. beta-BHC	L. Endosulfan II	V. Aroclor 1016	FF. Hexachlorobenzene	PP. Mirex
C. delta-BHC	M. 4,4'-DDD	W. Aroclor 1221	GG. Chlordane	QQ cis-Chlordane
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor 1232	HH. Chlordane (Technical)	RR. trans-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor 1242	II. Aroclor 1262	SS. Hexachlorobutadiene
F. Aldrin	P. Methoxychlor	Z. Aroclor 1248	JJ. Aroclor 1268	TT. Kepone
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor 1254	KK. Oxychlordane	UU. Chlorpyrifos
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor 1260	LL. trans-Nonachlor	VV
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. cis-Nonachlor	WW.
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. cis–Heptachlor epoxide	XX.

Notes:_____

LDC#: 60951T

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1946068-2,3-A LCS/D	See attached					30	All (ND+DET)	J det/P

Laboratory Control Sample Summary
Form 3
Pesticides

Client	: Roux Env. Eng. & Geology, DPC	**Lab Number**	: L2439451
Project Name	: ELMWOOD PRESERVE	**Project Number**	: 3858.0004Y000
Matrix (Level)	: SOIL (LOW)		
LCS Sample ID	: WG1946068-2 **Analysis Date** : 07/13/24 08:22	**File ID**	: 18240713a-08
LCSD Sample ID	: WG1946068-3 **Analysis Date** : 07/13/24 08:33	**File ID**	: 18240713a-09

		Laboratory Control Sample			Laboratory Control Duplicate						
Parameter		True (ug/kg)	Found (ug/kg)	%R	True (ug/kg)	Found (ug/kg)	%R	RPD		Recovery Limits	RPD Limit
Delta-BHC	C	32.8	(ND)	59	31.7	25.8	81	31	Q	30-150	30
Lindane		32.8	18.2	55	31.7	24.5	77	33	Q	30-150	30
Alpha-BHC	A	32.8	18.8	57	31.7	25.6	81	35	Q	30-150	30
Beta-BHC	B	32.8	21.7	66	31.7	28.5	90	31	Q	30-150	30
Heptachlor	E	32.8	19.2	58	31.7	25.1	79	31	Q	30-150	30
Aldrin	F	32.8		56	31.7	25.0	79	34	Q	30-150	30
Heptachlor epoxide	G	32.8	(Det)	52	31.7	23.1	73	34	Q	30-150	30
Endrin	K	32.8	(ND)	59	31.7	26.3	83	34	Q	30-150	30
Endrin aldehyde	R	32.8	19.5	59	31.7	26.4	83	34	Q	30-150	30
Endrin ketone	Q	32.8	20.0	61	31.7	27.0	85	33	Q	30-150	30
Dieldrin	I	32.8	(Det)	62	31.7	27.9	88	35	Q	30-150	30
4,4'-DDE	J	32.8	19.1	58	31.7	26.6	84	37	Q	30-150	30
4,4'-DDD	M	32.8	(ND)	63	31.7	28.3	89	34	Q	30-150	30
4,4'-DDT	O	32.8	(Det)	60	31.7	27.0	85	34	Q	30-150	30
Endosulfan I	H	32.8	(ND)	57	31.7	25.8	81	35	Q	30-150	30
Endosulfan II	L	32.8	19.4	59	31.7	26.6	84	35	Q	30-150	30
Endosulfan sulfate	N	32.8	17.9	54	31.7	23.9	75	33	Q	30-150	30
Methoxychlor	P	32.8	19.1	58	31.7	25.6	81	33	Q	30-150	30
cis-Chlordane	QQ	32.8		55	31.7	24.2	76	32	Q	30-150	30
trans-Chlordane	RR	32.8	(Det)	68	31.7	30.2	95	33	Q	30-150	30

J del/P

LDC#: 60951T

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	Heptachlor Epoxide	200	NJ/A
		trans-Chlordane	126	J det/A

Comments:___Heptachlor Epoxide reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL_____

LDC# 60951T

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10

LDC# 60951T

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1946532-1 PEST18	07/13/24	Dieldrin (CLP1)	1.294	1.315	1.315	1.6	1.6
			Dieldrin (CLP2)	1.124	1.198	1.198	6.6	6.6
			4,4'-DDD (CLP1)	1.056	1.085	1.085	2.7	2.7
			4,4'-DDD (CLP2)	0.929	0.992	0.992	6.8	6.8

LDC # 60951T

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	41.87	84	84	0
Tetrachloro-m- xylene	CLP2	50.0	41.54	83	83	0
Decachlorobiphenyl	CLP1	50.0	45.77	92	92	0
Decachlorobiphenyl	CLP2	50.0	46.99	94	94	0

LDC # 60951T

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1946068-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.8	31.7	18.2	24.5	55	55	77	77	33	30
DDT	32.8	31.7	19.8	27.0	60	60	85	85	34	31

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	Dieldrin	239600000	449000000	25.000	1.294	10.00	15.98	1.00	0.880	7.33	7.30	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2439451
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I12_2-4	L2439451-03	Metals

Associated QC Samples(s):

Field/Trip Blanks: FB_06282024_1, FB_06282024_2
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 28, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Antimony Iron Selenium	0.159 mg/Kg 0.986 mg/Kg 0.130 mg/Kg	1.426 mg/Kg 4.930 mg/Kg 0.650 mg/Kg	I12_2-4
ICB/CCB	Antimony Arsenic	0.2852 mg/L 0.1744 mg/L	1.426 mg/Kg 0.872 mg/Kg	I12_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
I12_2-4	Selenium	0.254 mg/Kg	1.78U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

Contamination were detected in the field blank samples FB_06282024_1 and FB_06282024_2 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_06282024_1	Nickel	0.00184 mg/L	0.0092 mg/Kg	I12_2-4
FB_06282024_2	Aluminum	0.00414 mg/L	0.0207 mg/Kg	I12_2-4
	Barium	0.00017 mg/L	0.00085 mg/Kg	

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I12_2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951T
SDG #: L2439451
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB_06282024_1 and FB_06282024_2
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12_2-4 2X, 6010D, matrix	L2439451-03		Soil	06/28/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
Antimony	0.159	0.2852	1.426					
Iron	0.986		4.930					
Selenium	0.130		0.650	0.254/1.78U				
Arsenic		0.1744	0.872					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Sampling Date: 06/28/24

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06282024_1							
Nickel	0.00184	0.0092						

Blank units: mg/L
Sampling Date: 06/28/24

Associated sample units: mg/kg
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level (mg/kg)						
	FB_06282024_2							
Aluminum	0.00414	0.0207						
Barium	0.00017	0.00085						

Comments: The action level, when applicable, is established at 5X the highest concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1852865-1 ICV	ICP	Cd	0.4993	0.500	99.86	100	Y
R1852865-8 CCV	ICP	Pb	0.5046	0.5000	100.92	101	Y
R1852865-5 ICSA	ICP	Mg	488.2687	500	97.65374	98	Y
R1852867-1 ICV	CVAA	Hg	0.002800	0.00300	93.33333333	93	Y
R1852867-17 CCV	CVAA	Hg	0.009654	0.0100	96.54	96	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1946574-2	LCS	Hg	1.62	1.7	97.00598802	97	Y
WG1946571-2	LCS	V	41.408	40.0	103.52	104	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Hg (ug/L)	0.334	1	0.397	50	88.4	0.048	0.047585397	Y
1	Al	122.5868	2	1.272	50	88.4	10900	10901.95367	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2439480
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I4_2-4	L2439480-02	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 27, 2024 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG1946068-2,3-A LCS/LCSD (I4_2-4)	delta-BHC	31	None
	Lindane	33	
	alpha-BHC	35	
	beta-BHC	31	
	Heptachlor	31	
	Aldrin	34	
	Heptachlor epoxide	34	
	Endrin	34	
	Endrin aldehyde	34	
	Endrin ketone	33	
	Dieldrin	35	
	4,4'-DDD	34	
	4,4'-DDT	34	
	Endosulfan I	35	
	Endosulfan II	35	
	Endosulfan sulfate	33	
	Methoxychlor	33	
	cis-Chlordane	32	
	trans-Chlordane	33	
WG1946068-2,3-A LCS/LCSD (I4_2-4)	4,4'-DDE	37	J (all detects)

No data were qualified due to high %Rs when the associated results were non-detected.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951U
SDG #: L2439480
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes / IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	A	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_2-4	L2439480-02		Soil	06/27/2024	Category B

Notes:

WG1946068-1 BS/LCS		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. trans–Heptachlor epoxide
B. beta-BHC	L. Endosulfan II	V. Aroclor 1016	FF. Hexachlorobenzene	PP. Mirex
C. delta-BHC	M. 4,4'-DDD	W. Aroclor 1221	GG. Chlordane	QQ cis-Chlordane
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor 1232	HH. Chlordane (Technical)	RR. trans-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor 1242	II. Aroclor 1262	SS. Hexachlorobutadiene
F. Aldrin	P. Methoxychlor	Z. Aroclor 1248	JJ. Aroclor 1268	TT. Kepone
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor 1254	KK. Oxychlordane	UU. Chlorpyrifos
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor 1260	LL. trans-Nonachlor	VV
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. cis-Nonachlor	WW.
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. cis–Heptachlor epoxide	XX.

Notes:_____

LDC#: 60951U

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1946068-2,3-A LCS/D	See attached					30	All (ND+DET)	J det/P

Laboratory Control Sample Summary
Form 3
Pesticides

Client	: Roux Env. Eng. & Geology, DPC	**Lab Number**	: L2439480
Project Name	: ELMWOOD PRESERVE	**Project Number**	: 3858.0004Y000
Matrix (Level)	: SOIL (LOW)		
LCS Sample ID	: WG1946068-2 **Analysis Date** : 07/13/24 08:22	**File ID**	: 18240713a-08
LCSD Sample ID	: WG1946068-3 **Analysis Date** : 07/13/24 08:33	**File ID**	: 18240713a-09

		Laboratory Control Sample			Laboratory Control Duplicate						
		True	Found	%R	True	Found	%R	RPD		Recovery	RPD
Parameter		(ug/kg)	(ug/kg)		(ug/kg)	(ug/kg)				Limits	Limit
Delta-BHC	C	32.8 (ND)	19.4	59	31.7	25.8	81	31	Q	30-150	30 J dets
Lindane		32.8	18.2	55	31.7	24.5	77	33	Q	30-150	30
Alpha-BHC	A	32.8	18.8	57	31.7	25.6	81	35	Q	30-150	30
Beta-BHC	B	32.8	21.7	66	31.7	28.5	90	31	Q	30-150	30
Heptachlor	E	32.8	19.2	58	31.7	25.1	79	31	Q	30-150	30
Aldrin	F	32.8	18.4	56	31.7	25.0	79	34	Q	30-150	30
Heptachlor epoxide	G	32.8	17.1	52	31.7	23.1	73	34	Q	30-150	30
Endrin	K	32.8	19.3	59	31.7	26.3	83	34	Q	30-150	30
Endrin aldehyde	R	32.8	19.5	59	31.7	26.4	83	34	Q	30-150	30
Endrin ketone	Q	32.8	20.0	61	31.7	27.0	85	33	Q	30-150	30
Dieldrin	I	32.8	20.4	62	31.7	27.9	88	35	Q	30-150	30
4,4'-DDE	J	32.8 (Det)	19.1	58	31.7	26.6	84	37	Q	30-150	30
4,4'-DDD	M	32.8 (ND)	20.6	63	31.7	28.3	89	34	Q	30-150	30
4,4'-DDT	O	32.8	19.8	60	31.7	27.0	85	34	Q	30-150	30
Endosulfan I	H	32.8	18.8	57	31.7	25.8	81	35	Q	30-150	30
Endosulfan II	L	32.8	19.4	59	31.7	26.6	84	35	Q	30-150	30
Endosulfan sulfate	N	32.8	17.9	54	31.7	23.9	75	33	Q	30-150	30
Methoxychlor	P	32.8	19.1	58	31.7	25.6	81	33	Q	30-150	30
cis-Chlordane	QQ	32.8	18.1	55	31.7	24.2	76	32	Q	30-150	30
trans-Chlordane	RR	32.8	22.4	68	31.7	30.2	95	33	Q	30-150	30

LDC# 60951U

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST18	6/30/2024	Dieldrin (CLP1)	1.282	1.282	1.294	1.294	8.21	8.20
			Dieldrin (CLP2)	1.145	1.145	1.124	1.124	4.75	4.75
			4,4'-DDD (CLP1)	1.089	1.088	1.056	1.056	4.38	4.39
			4,4'-DDD (CLP2)	0.964	0.964	0.929	0.929	4.09	4.10

LDC# 60951U

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1946532-1 PEST18	07/13/24	Dieldrin (CLP1)	1.294	1.315	1.315	1.6	1.6
			Dieldrin (CLP2)	1.124	1.198	1.198	6.6	6.6
			4,4'-DDD (CLP1)	1.056	1.085	1.085	2.7	2.7
			4,4'-DDD (CLP2)	0.929	0.992	0.992	6.8	6.8

LDC # 60951U

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	41.87	84	84	0
Tetrachloro-m- xylene	CLP2	50.0	41.54	83	83	0
Decachlorobiphenyl	CLP1	50.0	45.77	92	92	0
Decachlorobiphenyl	CLP2	50.0	46.99	94	94	0

LDC # 60951U

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1946068-2,3 LCS/D

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.8	31.7	18.2	24.5	55	55	77	77	33	30
DDT	32.8	31.7	19.8	27.0	60	60	85	85	34	31

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDE	125200000	445300000	25.000	1.291	10.00	15.78	1.00	0.890	3.88	3.88	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2439480
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I4_2-4	L2439480-02	Metals

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on June 27, 2024 and was analyzed for metals by SW-846 methods 6010D and 7471B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

All criteria were met.

Blanks

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Antimony Iron Selenium	0.159 mg/Kg 0.986 mg/Kg 0.130 mg/Kg	1.426 mg/Kg 4.930 mg/Kg 0.650 mg/Kg	I4_2-4
ICB/CCB	Antimony Arsenic	0.2852 mg/L 0.1744 mg/L	1.426 mg/Kg 0.872 mg/Kg	I4_2-4

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
I4_2-4	Selenium	0.268 mg/Kg	1.71U mg/Kg

These results can be used for project objectives as nondetect (U) which may have a minor impact on the data usability.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I4 2-4	2-fold dilution due to sample matrix for all metals except mercury

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951U
SDG #: L2439480
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	N	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL<samples<RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I4_2-4 2X, 6010D, matrix	L2439480-02		Soil	06/27/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	soil	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.			NA	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			NA	
Were %RSDs of isoptoes in the tuning solution ≤5%?			NA	
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?	YES			
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?		NO		
Were target analytes detected in the field blanks?			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		NO		
Were target analytes detected in the field duplicates?			NA	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			NA	
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?	YES			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50mL/1.25g (40X)

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (mg/L)**	**Action Level (mg/kg)**	1				
Antimony	0.159	0.2852	1.426					
Iron	0.986		4.930					
Selenium	0.130		0.650	0.268/1.71U				
Arsenic		0.1744	0.872					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1852865-1 ICV	ICP	Ba	0.5025	0.500	100.5	100	Y
R1852865-6 CCV	ICP	Al	0.4846	0.5000	96.92	97	Y
R1852865-3 ICSA	ICP	Ca	483.7816	500	96.75632	97	Y
R1852867-1 ICV	CVAA	Hg	0.002800	0.00300	93.33333333	93	Y
R1852867-15 CCV	CVAA	Hg	0.009654	0.0100	96.54	97	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1946574-2	LCS	Hg	1.62	1.7	97.00598802	97	Y
WG1946571-2	LCS	Se	10.04	9.60	104.5833333	104	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Hg (ug/L)	0.355	1	0.390	50	89.2	0.051	0.051023341	Y
1	Mn	3.8359	2	1.311	50	89.2	328	328.0195517	Y

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2439488
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
SV-04	L2439488-03	VOC, Hexachlorobutadiene
SV-10	L2439488-10	VOC, Hexachlorobutadiene
SV-10DL	L2439488-10DL	VOC

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: SV-10 and DUP_07122024

The above-listed air samples were collected on July 12, 2024 and were analyzed for volatile organic compounds (VOC) by TO-15 and hexachlorobutadiene by TO-15 in selected ion monitoring (SIM) mode. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Laboratory Duplicate (DUP) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

All canisters were cleaned as required by the method. The laboratory indicated that canister certification was performed by batch. No contaminants were found in the representative canister blank.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Laboratory Duplicate Results

All criteria were met.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples SV-10 and DUP_07122024 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

VOC

Analyte	Concentration (ppbv)		RPD
	SV-10	DUP_07122024	
Dichlorodifluoromethane	0.523	0.514	2
1,3-Butadiene	0.301	0.426	34
Ethanol	64.5	83.6	26
Acetone	405	495*	20
Trichlorofluoromethane	0.238	0.239	0
Isopropanol	3.61	5.34	39
tertiary Butyl alcohol	1.25	1.52	19
Methylene chloride	0.784	0.500U	Not calculable
Carbon disulfide	0.555	0.663	18
2-Butanone	226*	242*	7
Chloroform	1.28	1.28	0
n-Hexane	1.15	1.3	12
Cyclohexane	0.443	0.477	7
2,2,4-Trimethylpentane	0.497	0.511	3
Heptane	1.35	1.48	9
Toluene	0.990	1.13	13
2-Hexanone	30.2	27.7	9
Ethylbenzene	0.363	0.368	1
p/m-Xylene	1.64	1.68	2
Styrene	0.299	0.259	14
o-Xylene	1.05	0.980	7
4-Ethyltoluene	0.379	0.327	15
1,3,5-Trimethylbenzene	1.12	0.940	17
1,2,4-Trimethylbenzene	3.44	2.75	22

* Results were reported from dilution.

Hexachlorobutadiene

No results were detected in any of the samples.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the VOC and hexachlorobutadiene analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	VOC Analysis Reported
SV-10	1.065-fold dilution due to nature of sample matrix
SV-10DL	5.323-fold dilution due to nature of sample matrix

Dilutions were not required for hexachlorobutadiene analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

VOC

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Validation Action
SV-10	2-Butanone	Results exceeded calibration range.	Not reportable

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951V
SDG #: L2439488
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [signature]

Method: Volatiles (EPA TO-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 30% ICV ≤ 30%
IV	Continuing Calibration	A	CCV ≤ 30%
V	Laboratory Blanks/Canister Blanks	A/A	(by batch)
VI	Field Blank	N	
VII	Surrogate Spikes	N	not reqd
VIII	Laboratory Duplicate	A	DUP_07122024 (same SDG)
IX	Laboratory Control Sample	A	LCS
X	Field Duplicate	SW	D = 2/ DUP_07122024 (same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results <RL
XIII	Target Analyte Identification	A	
XIV	~~Leak Check Compound~~	-	
XV	Overall Assessment of Data	SW	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	SV-04	L2439488-03		Air	07/12/2024	Category B
2	SV-10 (1.065X)	L2439488-10		Air	07/12/2024	Category B
3	SV-10 DL (5.323X)	-10 DL		↓	↓	↓

(Results reported ND at RL)

Notes:

WG1948136-4 Blk		
WG1948645-✓	(M only)	

Method: Volatiles (EPA Method TO-15)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was canister pressure criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 24 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 30%?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after every ICAL for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 24 hours for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
V. Laboratory Blanks/Canister Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 24 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
Was a canister blank analyzed for every canister?	√			
Was there contamination in the canister blanks?		√		
VI. Field Blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes (Optional)				
Were all surrogate percent recoveries (%R) within QC limits?			√	
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Laboratory Duplicate				
Was a laboratory duplicate analyzed for this SDG?	√			
Were the relative percent differences (RPD) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch for this SDG?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Internal standards				
Were internal standard area counts within ± 40% from the associated calibration standard?	√			
Were retention times within ± 20.0 seconds from the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIII. Leak check compounds				
Was a leak check compound used to evaluate sample integrity and included in the laboratory analyte list?			√	
Was the leak check compound detected in the samples? If yes, please see leak check validation findings worksheet.			√	
X1V. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: GC/MS VOA (EPA Method TO15)

Compound	Concentration (ppbv)		RPD
	2	DUP_07122024	
Dichlorodifluoromethane	0.523	0.514	2
1,3-Butadiene	0.301	0.426	34
Ethanol	64.5	83.6	26
Acetone	405	495*	20
Trichlorofluoromethane	0.238	0.239	0
Isopropanol	3.61	5.34	39
Tertiary butyl Alcohol	1.25	1.52	19
Methylene chloride	0.784	0.500U	NC
Carbon disulfide	0.555	0.663	18
2-Butanone	226*	242*	7
Chloroform	1.28	1.28	0
n-Hexane	1.15	1.3	12
Cyclohexane	0.443	0.477	7
2,2,4-Trimethylpentane	0.497	0.511	3
Heptane	1.35	1.48	9
Toluene	0.990	1.13	13
2-Hexanone	30.2	27.7	9
Ethylbenzene	0.363	0.368	1
p/m-Xylene	1.64	1.68	2
Styrene	0.299	0.259	14
o-Xylene	1.05	0.980	7
4-Ethyltoluene	0.379	0.327	15
1,3,5-Trimethylbenzene	1.12	0.940	17
1,2,4-Trimethylbenzene	3.44	2.75	22

* Reported from dilution

LDC#: 60951V

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG

METHOD: GC/MS VOA (EPA Method TO15)

All available information pertaining to the data were reviewed for data quality, uncertainty and bias using professional judment to compliment the overall assessment made below.

#	Sample ID	Analyte	Findings	Qualifications
	2	2-Butanone	> cal range	NR

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA Method TO15)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (STD 10)	Recalculated RRF (STD 10)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL AIRLAB16	6/18/2024	Ethanol (BCM)	0.4120	0.4120	0.3985	0.3985	9.61	9.65
			Benzene (DFB)	0.8210	0.8205	0.7270	0.7270	10.07	10.08
			1,2,4-TMB (CBZ)	7.6420	7.6417	6.6860	6.6860	12.93	12.93
2	ICAL AIRLAB15	4/26/2024	2-Butanone (BCM)	1.7610	1.7611	1.4798	1.4797	12.53	12.53

LDC#: 60951V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA Method TO15)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	WG1948136-2 AIRLAB16	07/17/24	Ethanol	(BCM)	0.398	0.354	0.354	11.1	11.1
			Benzene	(DFB)	0.727	0.796	0.796	9.5	9.5
			1,2,4-TMB	(CBZ)	6.686	7.515	7.515	12.4	12.4
2	R1549482 AIRLAB15	07/18/04	2-Butanone	(BCM)	1.480	1.529	1.529	3.3	3.3

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA Method TO15)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948136-3 LCS

Compound	SA (ppbv)		SSC (ppbv)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	10.00	NA	11.1	NA	111	111				
Trichloroethene	10.00		10.7		107	107				
Benzene	10.00		10.3		103	103				
Toluene	10.00		9.58		96	96				
Chlorobenzene	10.00		10.9		109	109				

LCS - full scan

LDC # _60951V

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA Method TO15)

Analyte results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Is)(Vo)(MW)(DF)}{(Ais)(RRF)(Vi)(MV)}$$

Ax	Area of the analyte to be measured
Ais	Area of the internal standard
Is	Amount of internal standard added
Vi	Initial volume or weight of sample
Vo	Volume analyzed
RRF	Relative Response Factor (average) from the initial calibration
Df	Dilution Factor.
MW	Molecular weight
MV	Molar volume (24.45 at 25 deg C and 1 atm P; 22.4 at 20 deg C and 1 atm)

Sample #	Compound	Ax	Ai	Ci (ppbv)	RRF	DF	Vo (mL)	Vi (mL)	MW (g/mole)	MV (L)	Calculated Conc (ppbv)	Reported Conc (ppbv)	% Diff
1	1,2,4-TMB	911159	161880	10.00	6.6860	1.00	50.00	50.000	-	-	8.42	8.42	0
							ug/m3 =	(8.42)(120.19)			ug/m3	ug/m3	
								(24.45)			41.39	41.40	
							=	**41.391**					

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951V
SDG #: L2439488
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JV6
2nd Reviewer:

Method: Hexachlorobutadiene (EPA TO-15SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 30% ICV ≤ 30%
IV	Continuing Calibration	A	CCV ≤ 30%
V	Laboratory Blanks/Canister Blanks	A/A	(by batch - full scan)
VI	Field Blank	N	
VII	Surrogate Spikes	N	not reqd.
VIII	Laboratory Duplicate	A	DUP_07122024 (same SDG)
IX	Laboratory Control Sample	A	LCS
X	Field Duplicate	ND	D = 2/DUP_07122024 (same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	
XIII	Target Analyte Identification	A	no results < RL
XIV	Leak Check Compound	-	
XV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	SV-04	L2439488-03		Air	07/12/2024	Category B
2	SV-10	L2439488-10		Air	07/12/2024	Category B

Notes:

WG1948137-4 blk		

Method: Volatiles (EPA Method TO-15SIM)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was canister pressure criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 24 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 30%?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after every ICAL for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 24 hours for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
V. Laboratory Blanks/Canister Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 24 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
Was a canister blank analyzed for every canister?	√			
Was there contamination in the canister blanks?		√		
VI. Field Blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Surrogate spikes (Optional)				
Were all surrogate percent recoveries (%R) within QC limits?			√	
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Laboratory Duplicate				
Was a laboratory duplicate analyzed for this SDG?	√			
Were the relative percent differences (RPD) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch for this SDG?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Internal standards				
Were internal standard area counts within ± 40% from the associated calibration standard?	√			
Were retention times within ± 20.0 seconds from the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
Were manual integrations reviewed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Leak check compounds				
Was a leak check compound used to evaluate sample integrity and included in the laboratory analyte list?			√	
Was the leak check compound detected in the samples? If yes, please see leak check validation findings worksheet.			√	
X1V. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA Method TO15SIM)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (STD 10)	Recalculated RRF (STD 10)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL AIRLAB16 SIM	06/18/24	Hexachlorobutadiene (CBZ)	2.8640	2.8640	2.5046	2.5047	19.98	19.99

LDC#: 60951V

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA Method TO15)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	WG1948137-2 SIM	07/17/24	Hexachlorobutadiene (CBZ)	2.505	2.957	2.957	18.0	18.1

LDC # _60951V

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA Method TO15-SIM)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948137-3 LCS

Compound	SA (ppbv)		SSC (ppbv)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Hexachlorobutadiene	5.00	NA	5.90	NA	118	118				

LCS - full scan

LDC # _60951V

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA Method TO15-SIM)

Analyte results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Is)(Vo)(MW)(DF)}{(Ais)(RRF)(Vi)(MV)}$$

Ax	Area of the analyte to be measured
Ais	Area of the internal standard
Is	Amount of internal standard added
Vi	Initial volume or weight of sample
Vo	Volume analyzed
RRF	Relative Response Factor (average) from the initial calibration
Df	Dilution Factor.
MW	Molecular weight
MV	Molar volume (24.45 at 25 deg C and 1 atm P; 22.4 at 20 deg C and 1 atm)

Sample #	Compound	Ax	Ai	Ci (ppbv)	RRF	DF	Vo (mL)	Vi (mL)	MW (g/mole)	MV (L)	Calculated Concentration (ppbv)	Reported Concentration (ppbv)	% Diff
LCS	Hexachlorobutadiene	155462	105137	10.00	2.5046	1.00	50.00	50.000	-	-	5.90	5.90	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2439714
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
RMW-10	L2439714-01	VOC, SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide
RMW-10MS	L2439714-01MS	VOC, SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide
RMW-10MSD	L2439714-01MSD	VOC, SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide

Associated QC Samples(s):

Field/Trip Blanks: TB_07152024_3, FB_07152024_3, EB_07152024_3
Field Duplicate pair: RMW-10, DUP_07152024_3

The above-listed water samples were collected on July 15, 2024 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, SVOC by SW-846 method 8270E in selected ion monitoring (SIM) mode, 1,4-dioxane by SW-846 method 8270E in SIM mode, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers with the exception listed below.

The SVOC nondetect results for 2,4-dinitrophenol, 4,6-dinitro-o-cresol, and benzoic acid in sample RMW-10 were rejected (R) due to MS/MSD percent recoveries. The results are not usable for project objectives, which may have a major impact on the data usability.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC, SVOC-SIM, 1,4-Dioxane

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
06/03/24	ICAL VOA105	1,4-Dioxane	0.002	RMW-10	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
07/17/24	V29240628A01.D	Bromomethane	39.8	RMW-10	UJ (all non-detects)
		Chloroethane	37.1		UJ (all non-detects)
		1,1-Dichloroethene	23.8		UJ (all non-detects)
		1,4-Dioxane	28.3		UJ (all non-detects)
		4-Methyl-2-pentanone	24.2		UJ (all non-detects)
		1,2-Dibromoethane	20.7		UJ (all non-detects)
		Bromoform	32.8		UJ (all non-detects)
		1,1,2,2-Tetrachloroethane	21.2		UJ (all non-detects)
		1,2,3-Trichloropropane	23.8		UJ (all non-detects)
		trans-1,4-Dichloro-2-butene	24.4		UJ (all non-detects)
		1,2-Dibromo-3-chloropropane	28.0		UJ (all non-detects)
		Naphthalene	20.1		UJ (all non-detects)
		1,2,3-Trichlorobenzene	20.6		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (≥0.005)	Associated Samples	Validation Action
07/17/24	V29240628A01.D	1,4-Dioxane	0.00109	RMW-10	UJ (all non-detects)

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/19/24	WG1948889-1	CLP1	Heptachlor	20.9	RMW-10	J (all detects)
			Aldrin	20.4		UJ (all non-detects)
			Heptachlor epoxide	24.8		
			trans-Chlordane	20.1		
			cis-Chlordane	30.5		
			4,4'-DDE	23.5		
			Endosulfan I	26.5		
			Endrin	20.4		
			Endosulfan II	23		
			4,4'-DDT	22.2		
			Endrin aldehyde	27		
			Endosulfan sulfate	24		

Herbicide

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
07/20/24	WG1949320-1	CLP1	2,4-D	24.4	RMW-10	UJ (all non-detects)
			2,4,5-TP (Silvex)	22.7		UJ (all non-detects)
			2,4,5-T	26.5		UJ (all non-detects)

SVOC, SVOC-SIM, 1,4-Dioxane, PCB

All criteria were met.

Blanks

VOC

Contamination was not detected in the method blanks.

No positive results were found in the trip blank sample TB_07152024_3 for VOC analysis.

Contamination was detected in the field blank sample FB_07152024_3 for VOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_07152024_3	Acetone	2.5 ug/L	RL	RMW-10

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

SVOC

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_07152024_3 for SVOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_07152024_3	Phenol	2.1 ug/L	RL	RMW-10

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

SVOC-SIM

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_07152024_3 for SVOC-SIM analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_07152024_3	Naphthalene	0.06 ug/L	RL	RMW-10
	2-Methylnaphthalene	0.03 ug/L	RL	
	Hexachlorobenzene	0.01 ug/L	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

Pesticide

Contamination was not detected in the method blanks.

Contamination was detected in the field blank sample FB_07152024_3 for pesticide analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB_07152024_3	4,4'-DDT	0.004 ug/L	RL	RMW-10

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
RMW-10	4,4'-DDT	0.005 ug/L	0.029U ug/L

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

1,4-Dioxane

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_07152024_3 and equipment blank sample EB_07152024_3 for 1,4-dioxane analysis.

PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_07152024_3 for PCB and herbicide analyses.

Surrogate Recoveries

SVOC-SIM

Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for sample RMW-10. Using professional judgment, no data were qualified when one base or one acid surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VOC, SVOC, 1,4-Dioxane, Pesticide, PCB, Herbicide

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
RMW-10MS/MSD (RMW-10)	Chloroethane	160 (55-138)	160 (55-138)	None
RMW-10MS/MSD (RMW-10)	Hexachlorobutadiene	-	62 (63-120)	UJ (all non-detects)
	1,2,4-Trichlorobenzene	-	69 (70-130)	UJ (all non-detects)
	trans-1,4-Dichloro-2-butene	66 (70-130)	64 (70-130)	UJ (all non-detects)

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
RMW-10MS/MSD (RMW-10)	2,4,6-Trichlorophenol	11 (30-130)	19 (30-130)	UJ (all non-detects)
	2-Chlorophenol	25 (27-123)	-	UJ (all non-detects)
	2,4-Dichlorophenol	25 (30-130)	-	UJ (all non-detects)
	2-Nitrophenol	24 (30-130)	-	UJ (all non-detects)
	2,4,5-Trichlorophenol	18 (30-130)	-	UJ (all non-detects)
RMW-10MS/MSD (RMW-10)	4-Nitrophenol	85 (10-80)	95 (10-80)	None
RMW-10MS/MSD (RMW-10)	2,4-Dinitrophenol	0 (20-130)	0 (20-130)	R (all non-detects)
	4,6-Dinitro-o-cresol	0 (20-164)	0 (20-164)	R (all non-detects)
	Benzoic acid	0 (10-164)	0 (10-164)	R (all non-detects)

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
RMW-10MS/MSD (RMW-10)	2,4,6-Trichlorophenol	51	None
	2-Chlorophenol	62	
	2,4-Dichlorophenol	58	
	2-Nitrophenol	58	
	Phenol	35	
	2,4,5-Trichlorophenol	59	

No data were qualified due to high RPDs when the associated results were non-detected.

SVOC-SIM

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (40-140)	MSD %R (40-140)	Validation Action
RMW-10MS/MSD (RMW-10)	Pentachlorophenol	3	3	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

1,4-Dioxane, Pesticide, PCB, Herbicide

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1948674-3, 4 LCS/LCSD (RMW-10)	Chloroethane	140 (55-138)	140 (50-138)	None
WG1948674-3, 4 LCS/LCSD (RMW-10)	trans-1,4-Dichloro-2-butene	-	68 (70-130)	UJ (all non-detects)

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤20)	Validation Action
WG1948674-3, 4 LCS/LCSD (RMW-10)	Carbon disulfide	26	None

No data were qualified due to high RPDs when the associated results were non-detected.

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1948680-2,3 LCS/LCSD (RMW-10)	4-Nitrophenol	-	84 (10-80)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG1948680-2,3 LCS/LCSD (RMW-10)	1,2-Dichlorobenzene Hexachloroethane Phenol	32 31 32	None

No data were qualified due to high RPDs when the associated results were non-detected.

Herbicide

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG1948515-2,3 LCS/LCSD (RMW-10)	2,4,5-T	156 (30-150)	-	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

SVOC-SIM, 1,4-Dioxane, Pesticide, PCB

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples RMW-10 and DUP_07152024_3 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

SVOC-SIM

Analyte	Concentration (ug/Kg)		RPD
	RMW-10	DUP_07152024_3	
Naphthalene	0.10U	0.05	Not calculable
Fluorene	0.10U	0.03	Not calculable
Phenanthrene	0.10U	0.05	Not calculable
2-Methylnaphthalene	0.10U	0.12	Not calculable

Pesticide

Analyte	Concentration (ug/L)		RPD
	RMW-10	DUP_07152024_3	
4,4'-DDT	0.005	0.029U	Not calculable

PCB

Analyte	Concentration (ug/L)		RPD
	RMW-10	DUP_07152024_3	
Aroclor 1254	1.14	0.071U	Not calculable
PCBs, Total	1.14	0.071U	Not calculable

VOC, SVOC, 1,4-Dioxane, Herbicide

No results were detected in any of the samples.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the pesticide analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, SVOC-SIM, 1,4-

dioxane, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, SVOC-SIM, 1,4-dioxane, pesticide, PCB, and herbicide analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
RMW-10	4,4'-DDT	60.3	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/A	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB = FB_07152024_3 (same SDG) TB = TB_ ↓ ↓
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	ND	D = 1/DUP_07152024_3 same SDG
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

WG1948674 - 5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	6/3/2024	ICAL VOA105	1,4-Dioxane		0.002 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	7/17/2024	V29240628A01.D	Bromomethane	39.8		All (ND)	J/UJ/A
			Chloroethane	37.1			
			1,1-Dichloroethene	23.8			
			1,4-Dioxane	28.3			
			4-Methyl-2-pentanone	24.2			
			1,2-Dibromoethane	20.7			
			Bromoform	32.8			
			1,1,2,2-Tetrachloroethane	21.2			
			1,2,3-Trichloropropane	23.8			
			trans-1,4-Dichloro-2-butene	24.4			
			1,2-Dibromo-3-chloropropane	28.0			
			Naphthalene	20.1			
			1,2,3-Trichlorobenzene	20.6			
			1,4-Dioxane		0.00109 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 7/15/2024 **Blank units:** ug/L **Associated sample units:** ug/L
Field blank type: FB **Associated Samples:** ALL (ND)

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB_07152024								
Acetone	2.5								

Sampling date: **Blank units:** **Associated sample units:**
Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	Chloroethane	160	160	55-138			1 (ND)	J det/A
	Hexachlorobutadiene	-	62	63-120				J/UJ/A
	1,2,4-Trichlorobenzene	-	69	70-130				
	trans-1,4-Dichloro-2-butene	66	64	70-130				

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG1948674-3, 4 LCS/D	Chloroethane	140	140	55-138			All (ND)	J det/P
	trans-1,4-Dichloro-2-butene	-	68	70-130				J/UJ/P
	Carbon disulfide				26	20		J det/P

LDC #: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 10 std)	Recalculated RRF (RRF 10 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA105 w	06/03/24	Benzene (FBZ)	0.983	0.983	0.991	0.991	11.52	7.40
			Ethylbenzene (CBZ)	1.614	1.614	1.631	1.631	1.59	1.61
			Naphthalene (DCB)	1.608	1.608	1.620	1.620	2.05	2.04

LDC #: 60951W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V05240717N01.D	07/17/24	Benzene	(FBZ)	0.991	0.888	0.888	10.4	10.4
			Ethylbenzene	(CBZ)	1.631	1.454	1.454	10.9	10.9
			Naphthalene	(DCB)	1.620	1.294	1.294	20.1	20.1

LDC# 60951W

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	10.0	10.94	109	109	0
1,2-Dichloroethane-d4	10.0	10.46	105	105	0
Toluene-d8	10.0	10.03	100	100	0
4-Bromofluorobenzene	10.0	9.53	95	95	0

LDC# 60951W

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3___

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	10.0	10.0	0	13.470	12.979	130	135	130	130	0	4
Benzene	10.0	10.0	0	9.945	10.226	99	99	100	102	1	3
Trichloroethene	10.0	10.0	0	9.495	9.748	95	95	97	97	2	3
Toluene	10.0	10.0	0	9.246	9.580	92	92	96	96	4	4
Chlorobenzene	10.0	10.0	0	9.566	10.026	96	96	100	100	4	5

LDC# 60951W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948674-3,4 LCS/D

Compound	SA (ug/L)		SSC (on-col) (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	10.00	10.00	12.380	12.958	124	124	130	130	8	5
Benzene	10.00	10.00	8.965	9.142	90	90	91	91	1	2
Trichloroethene	10.00	10.00	9.011	8.968	90	90	90	90	0	0
Toluene	10.00	10.00	8.724	8.742	87	87	87	87	0	0
Chlorobenzene	10.00	10.00	9.409	9.501	94	94	95	95	1	1

VALIDATION FINDINGS WORKSHEET

Sample Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	BENZENE	283490	319222	10.0	0.991	1.0	5.00	5.00	na	9.0	9.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 30%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB = FB_07152024 (same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	ND	D = 1/DUP_07152024_3 (same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

(no PAH)

Notes:

WG1948680 - 1 Batch		

LDC#: 60951W

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: SVOA (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: _JVG

METHOD: GC/MS PAH (EPA SW 846 Method 8270E)

Field blanks were identified in this SDG.

No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 7/15/2024 **Blank units:** ug/L **Associated sample units:** ug/L

Field blank type: FB **Associated Samples:** ALL (ND)

(FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB_07152024								
Phenol	2.1								

Sampling date: **Blank units:** **Associated sample units:**

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	2,4,6-Trichlorophenol	11	19	30-130			1 (ND)	J/UJ/A
	2-Chlorophenol	25	-	27-123				
	2,4-Dichlorophenol	25	-	30-130				
	2-Nitrophenol	24	-	30-130				
	4-Nitrophenol	85	95	10-80				J det/A
	2,4-Dinitrophenol	0	0	20-130				J/R/A
	4,6-Dinitro-o-cresol	0	0	20-164				
	2,4,5-Trichlorophenol	18	-	30-130				J/UJ/A
	Benzoic Acid	0	0	10-164				J/R/A
	2,4,6-Trichlorophenol				51	30		J det/A
	2-Chlorophenol				62			
	2,4-Dichlorophenol				58			
	2-Nitrophenol				58			
	Phenol				35			
	2,4,5-Trichlorophenol				59			

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG1948680-2,3 LCS/D	4-Nitrophenol	-	84	10-80			All (ND)	J det/P
	1,2-Dichlorobenzene				32	30		
	Hexachloroethane				31			
	Phenol				32			

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 5.0 std)	Recalculated RRF (RRF 5.0 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL SV112	6/25/2024	Phenol (DCB)	1.566	1.566	1.577	1.577	6.62	6.62
			2,4,6-TCP (NPT)	0.249	0.249	0.256	0.256	7.06	7.01
			Diethylphthalate (ANT)	1.341	1.341	1.487	1.487	9.42	9.41
			Carbazole (PHN)	0.948	0.948	0.948	0.948	7.18	7.18
			BEHP (CRY)	0.610	0.610	0.639	0.638	10.51	10.50

LDC#: 60951W

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0718	07/18/24	Phenol (DCB)	1.577	1.331	1.331	15.6	15.6
			2,4,6-TCP (NPT)	0.256	0.237	0.237	7.4	7.4
	SV112		Diethylphthalate (ANT)	1.487	1.255	1.255	15.6	15.6
			Carbazole (PHN)	0.948	0.870	0.870	8.2	8.2
			BEHP (CRY)	0.639	0.594	0.594	7.0	7.0

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	1.000	0.820	82	82	0
2-Fluorobiphenyl	1.000	0.774	77	77	0
Terphenyl-d14	1.000	0.760	76	76	0
Phenol-d5	2.000	0.620	31	31	0
2-Fluorophenol	2.000	0.595	30	30	0
2,4,6-Tribromophenol	2.000	0.875	44	44	0

LDC # 60951W

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration
MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

MS/MSD ID:___2/3_____

Compound	SA (ug/L)		SC (ug/L)	SSC (on col) (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	2.00	2.00	0	0.397	0.568	20	20	29	28	35	35
N-Nitroso-di-n-propylamine	2.00	2.00	0	1.583	1.879	80	79	95	94	17	17
4-Chloro-3-methylphenol	2.00	2.00	0	1.315	1.682	65	66	85	84	27	24
Acenaphthene											
Pentachlorophenol											
Pyrene											

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948680-2,3 LCS/D

Compound	SA (ug/L)		SSC (on-col) (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	2.0	2.0	0.584	0.795	29	29	40	40	32	31
N-Nitroso-di-n-propylamine	2.0	2.0	1.255	1.666	63	63	83	83	27	28
4-Chloro-3-methylphenol	2.0	2.0	1.334	1.707	67	67	85	85	24	25
Acenaphthene										
Pentachlorophenol										
Pyrene										

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (mL)	% Solids	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	Phenol	4778	20738	4.0	1.577	1.00	1000.0	100.00	na	5.8	5.8	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: ~~PAHs~~ SVOCs (EPA 8270E SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r ICV ≤ 30%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB = FB_07152024 (same SDG)
VII	Surrogate Spikes	SW	#1 (only 1 out NA)
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCSD
X	Field Duplicate	SW	D = 1/DUP_07152024_1 (same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

LDC#: 60951W

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: SVOC (EPA SW 846 Method 8270ESIM)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?		√		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: _JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270ESIM)

Field blanks were identified in this SDG.

No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 7/15/2024 **Blank units:** ug/L **Associated sample units:** ug/L

Field blank type: FB **Associated Samples:** ALL (ND)

(FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB_07152024								
Naphthalene	0.06								
2-Methylnaphthalene	0.03								
Hexachlorobenzene	0.01								

Sampling date: **Blank units:** **Associated sample units:**

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS SVOC (EPA SW 846 Method 8270ESIM)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	Pentachlorophenol	3	3	40-140			1 (ND)	J/UJ/A

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: GC/MS SVOC (EPA SW 846 Method 8270ESIM)

Compound	Concentration (ug/Kg)		RPD
	1	DUP_071524	
Naphthalene	0.10U	0.05	NC
Fluorene	0.10U	0.03	NC
Phenanthrene	0.10U	0.05	NC
2-Methylnaphthalene	0.10U	0.12	NC

LDC #: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E-SIM)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

average RRF = sum of the RRFs/number of standards

%RSD = 100 * (S/X)

Where

A_x = Area of Compound

C_x = Concentration of compound,

S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (5000 std)	Recalculated RRF (5000 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	2/23/2024	Hexachloroethane (DCB)	0.525	0.525	0.543	0.543	4.58	4.60
			Acenaphthylene (NPT)	1.233	1.233	1.184	1.184	7.22	7.23
	SV125		Fluorene (ANT)	1.514	1.514	1.565	1.565	3.84	3.83
			Phenanthrene (PHN)	1.052	1.052	1.157	1.157	4.65	4.63
			Chrysene (CRY)	1.421	1.421	1.429	1.428	10.07	10.06
			Benzo(a)pyrene (PRY)	1.292	1.292	1.155	1.154	12.91	12.90

LDC #: 60951W

Continuing Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E-SIM)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standar
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	CCV0722	7/22/2024	Hexachloroethane (DCB)	0.543	0.608	0.608	12.0	12.0
			Acenaphthylene (NPT)	1.184	1.249	1.249	5.5	5.5
	SV119		Fluorene (ANT)	1.565	1.596	1.596	2.0	2.0
			Phenanthrene (PHN)	1.157	1.165	1.165	0.7	0.7
			Chrysene (CRY)	1.429	1.502	1.502	5.1	5.1
			Benzo(a)pyrene (PRY)	1.155	1.360	1.360	17.7	17.7

LDC # 60951W

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ng/mL)	Surrogate Found (ng/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	1000.00	1233.883	123	123	0
2-Fluorobiphenyl	1000.00	823.936	82	82	0
Terphenyl-d14	1000.00	966.449	97	97	0
Phenol-d5	2000.00	796.443	40	40	0
2-Fluorophenol	2000.00	679.067	34	34	0
2,4,6-Tribromophenol	2000.00	1061.411	53	53	0

LDC # 59773T2a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (on-col) (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	2000.00	2000.00	0	1706.42	1944.16	85	85	95	97	11	13
Pentachlorophenol	2000.00	2000.00	0	62.39	61.89	3	3	3	3	0	1
Pyrene	2000.00	2000.00	0	1718.57	1963.91	85	86	100	98	16	13

LDC # 60951W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948681-2,3 LCS/D

Compound	SA (ug/L)		SSC (on-col) (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2000.00	2000.00	1681.163	1797.281	84	84	90	90	7	7
Pentachlorophenol	2000.00	2000.00	1858.132	1982.824	93	93	99	99	6	6
Pyrene	2000.00	2000.00	1842.97	1828.45	92	92	91	91	1	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ng/mL)	RRF	DF	Ve (mL)	Vo (mL)	% S/100	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	Pyrene	1323597	2048406	4000.0	1.402	1.00	1.0	100.00	na	18.44	18.00	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: ~~PAHs (EPA 8270E SIM);~~ 1,4-Dioxane (EPA 8270E SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICVE 30%
IV	Continuing Calibration	A	CCVE ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB_07152024 (Same SDG) EB = EB_ ↓ ↓
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	ND	D = 1/DUP_07152024_3 (Same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

WG1948127-1 Blk		

LDC #: 60951W

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: 1,4-Dioxane (EPA SW 846 Method 8270E-SIM)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 15% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤20%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC #: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8270E-SIM)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PAH 5	7/17/2024	1,4-Dioxane (DXN-d8)	1.781	1.781	1.796	1.796	3.27	3.27

LDC #: 60951W

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8270E-SIM)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Ref IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	F507182432	07/18/24	1,4-Dioxane (DXN-d8)	1.796	1.898	1.898	5.7	5.7

LDC# 60951W

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
1,4-dioxane-d8	500.00	204.99	41	41	0

LDC# 60951W

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the analyte identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3_____

Compound	SA (ng/L)		SC (ng/L)	SSC (ng/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,4-Dioxane	4810.0	4810.0	0	5150.0	5120.0	107	107	106	106	1	1

LDC# 60951W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the analytes identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948127-2,3 LCS/D

Compound	SA				LCS		LCSD		LCS/LCSD	
	(ng/L)		(ng/L)		Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,4-Dioxane	5000.00	5000.00	5250.0	5290.0	105	105	106	106	1	1

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E-SIM)

Analyte results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ng/mL)	RRF	DF	Vp (mL)	Vo (L)	% Solids	Calculated Concentration (ng/L)	Reported Concentration (ng/L)	% Diff
LCS	1,4-Dioxane	3948	2095	500	1.7960	1.00	2.50	0.25	NA	5246.3	5250.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVC
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	SW	FB = FB_07152024 (same SDG)
VII	Surrogate Spikes / IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	SW	D = 1 / DUP_07152024_3 (same SDG)
XI	Target Analyte Quantitation	SW	Results <RL > MDL = Jdets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

WG1948100-1 Blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. trans–Heptachlor epoxide
B. beta-BHC	L. Endosulfan II	V. Aroclor 1016	FF. Hexachlorobenzene	PP. Mirex
C. delta-BHC	M. 4,4'-DDD	W. Aroclor 1221	GG. Chlordane	QQ cis-Chlordane
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor 1232	HH. Chlordane (Technical)	RR. trans-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor 1242	II. Aroclor 1262	SS. Hexachlorobutadiene
F. Aldrin	P. Methoxychlor	Z. Aroclor 1248	JJ. Aroclor 1268	TT. Kepone
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor 1254	KK. Oxychlordane	UU. Chlorpyrifos
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor 1260	LL. trans-Nonachlor	VV
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. cis-Nonachlor	WW.
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. cis–Heptachlor epoxide	XX.

Notes:_____

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/19/2024	WG1948889-1	CLP1	see attached		ALL (all ND except DDT)	J/UJ/A

Calibration Verification Summary
Form 7
Pesticides

Client	: Roux Env. Eng. & Geology, DPC	**Lab Number**	: L2439714
Project Name	: ELMWOOD PRESERVE	**Project Number**	: 3858.0004Y000
Instrument ID	: PEST11	**Calibration Date**	: 07/19/24 06:30
Lab File ID	: 11240719a-03	**Init. Calib. Date(s)**	: 06/25/24 06/26/24
Sample No	: WG1948889-1	**Init. Calib. Times**	: 20:38 01:13
Channel	: A		

Compound		Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
1-br-2-nb_Pesticides		1	1	-	0	20	134	0
2,4,5,6-Tetrachloro-m-xylen		1.233	1.009	-	18.2	20	111	0
Hexachlorobenzene		1.38	1.169	-	15.3	20	120	0
alpha-BHC		1.649	1.468	-	11	20	112	0
gamma-BHC (lindane)		1.538	1.321	-	14.1	20	110	0
beta-BHC		50	41.449	-	17.1	20	109	0
delta-BHC		1.537	1.298	-	15.5	20	107	0
Heptachlor	E	1.567	1.239	-	20.9*	20	106	0
Aldrin	F	1.473	1.172	-	20.4*	20	104	0
Alachlor		50	48.769	-	2.5	20	118	0
Chlorpyrifos		50	36.734	-	26.5*	20	93	0
Heptachlor Epoxide	G	1.441	1.084	-	24.8*	20	103	0
gamma-Chlordane (trans)	RR	1.378	1.101	-	20.1*	20	114	0
alpha-Chlordane (cis)	QQ	1.559	1.084	-	30.5*	20	98	0
4,4'-DDE	J	1.394	1.067	-	23.5*	20	100	0
Endosulfan I	H	1.37	1.007	-	26.5*	20	100	0
Dieldrin		1.418	1.142	-	19.5	20	109	0
Endrin	K	1.369	1.09	-	20.4*	20	105	0
4,4'-DDD		1.114	0.901	-	19.1	20	106	0
Endosulfan II	L	1.281	0.986	-	23*	20	104	0
4,4'-DDT	O	1.232	0.959	-	22.2*	20	107	0
Endrin Aldehyde	R	50	36.518	-	27*	20	96	0
Methoxychlor		50	42.695	-	14.6	20	105	0
Mirex		50	38.597	-	~~22.8*~~	20	100	0
Endosulfan Sulfate	N	1.237	0.94	-	24*	20	106	0
Endrin Ketone		1.342	1.153	-	14.1	20	115	0
Decachlorobiphenyl		1.251	0.507	-	59.5*	20	59	0

J/WJ/A

* Value outside of QC limits.

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Field Blanks

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Field blanks were identified in this SDG.

No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 7/15/2024 **Blank units:** ug/L **Associated sample units:** ug/L

Field blank type: FB **Associated Samples:** ALL

(FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB_07152024		1						
4,4'-DDT	0.004		0.005/0.029U						

Sampling date: _____ **Blank units:** _____ **Associated sample units:** _____

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Compound	Concentration (ug/L)		RPD
	1	DUP_07152024_3	
4,4'-DDT	0.005	0.029U	NC

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	4,4'-DDT	60.3	J det/A

Comments:_____

_____

_____

LDC # 60951W

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: _1_

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	25.97	52	52	0
Tetrachloro-m- xylene	CLP2	50.0	30.48	61	61	0
Decachlorobiphenyl	CLP1	50.0	16.35	33	33	0
Decachlorobiphenyl	CLP2	50.0	26.69	53	53	0

LDC # 60951W

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	0.357	0.357	0	0.233	0.219	65	65	61	61	6	6
DDT	0.357	0.357	0.005	0.218	0.214	61	60	59	59	2	2

DDT conc in parenbt not used in the lab calcualtions.

LDC # 60951W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1948100-2,3 LCS/D

Compound	SA (ug/L)		SSC (on col) (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	0.357	0.357	0.238	0.223	67	67	62	62	7	7
DDT	0.357	0.357	0.226	0.203	63	63	57	57	11	11

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (mL)	DF	% Solids/100	Calculated conc (ug/L)	Reported conc (ug/L)	% Diff
1	DDT	6564513	199700000	25.000	1.232	1.00	140.00	1.00	NA	0.005	0.005	0
	CLP1											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD≤ 20% ICV≤ 20%
III	Continuing Calibration	A	CCV≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB_07152024 (same SDG)
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	SW	D=1/DUP_07152024_3 (same SDG)
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

WG1947844-1 Blk		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Compound	Concentration (ug/L)		RPD
	1	DUP_07152024_3	
Aroclor 1254	1.14	0.071U	NC
PCBs, Total	1.14	0.071U	NC

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST2	7/16/2024	1260-1 (CLP1)	0.066	0.066	0.069	0.069	5.15	4.99
			1260-1 (CLP2)	0.055	0.055	0.063	0.063	14.39	14.33

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1948081-5	07/17/24	1260-1 (CLP1)	0.069	0.058	0.058	8.7	15.9
	PEST2		1260-1 (CLP2)	0.063	0.056	0.056	11.1	11.1

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG__

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	20	11.314	57	57	0
Tetrachloro-m- xylene	RTX-CLP2	20	11.639	58	58	0
Decachlorobiphenyl	RTX-CLP1	20	13.963	70	70	0
Decachlorobiphenyl	RTX-CLP2	20	13.392	67	67	0

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	1.78	1.78	0	1.30	1.37	73	73	77	77	5	5

Note: Parent conc not used in the lab calculation for %R.

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer:__JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: __WG1947844-2,3 LCS/D__

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	2	2	1	1	65	65	67	67	3	3

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (mL)	DF	% Solids/100	Calculated on-col conc (ug/L)	Reported on-col conc (ug/L)	% Diff
1	1254-1	7.247E+07	2.997E+08	25	0.048	1.00	140.00	1.00	NA	**126.49**	126.50	0
	CLP2											
											Reported	
	1254-Total =	(126.49+166.363+166.627+176.069+159.309)						conc =	(158.97)(1.0 mL)		**final conc**	
			5						(140mL)			
	=	158.97						=	**1.136**		**1.14**	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	SW	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-07152024 same SDG
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	SW	LCS/D
IX	Field Duplicate	ND	D = 1/DUP-07152024-3 same SDG
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

LDC #: 60951W

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: GC Herbicides (EPA SW 846 Method 8151A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			√	
Were the RT windows properly established?	√			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
V. Field Blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	7/20/2024	WG1949320-1	CLP1	2,4-D	24.4	ALL (ND)	J/UJ/A
				2,4,5-TP (Silvex)	22.7		
				2,4,5-T	26.5		

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG1948515-2,3 LCS/D	2,4,5-T	156	-	30-150			All (ND)	J det/P

LDC #: 60951W

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.47 std)	Recalculated CF (0.47 std)	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest17	07/17/24	2,4,5-TP (Silvex) (Col 1)	0.634	0.634	0.661	0.661	3.52	3.52
			2,4,5-TP (Silvex) (Col 2)	0.783	0.783	0.826	0.826	7.30	7.29

LDC #: 60951W

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	CF	Reported CF (CCV)	Recalculated CF (CCV)	Reported % D	Recalculated %D
1	WG1211382-2	7/20/2024	2,4,5-TP (Silvex) (Col 1)	0.661	0.811	0.811	22.8	22.8
			2,4,5-TP (Silvex) (Col 2)	0.826	0.819	0.819	0.8	0.8

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG1943026-2,3 LCS/D

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	5.00	5.00	7.45	6.54	149	149	131	131	13	13

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3___

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4,5-TP (Silvex)	5.0	5.0	0.0	6.9	6.4	137	137	127	127	8	8

LDC#: 60951W

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (uL)	Vo (L)	DF	% Solids/100	Calculated conc (ug/L)	Reported conc (ug/L)	% Diff
LCS	2,4,5-TP	1129400000	573500000	0.250	0.6610	10	1.00	1.00	NA	7.45	7.45	0
	CLP1											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2439714
Reviewer:	Nancy Carpenter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
RMW-10	L2439714-01	Metals, Wet Chemistry
RMW-10MS	L2439714-01MS	Metals, Wet Chemistry
RMW-10MSD	L2439714-01MSD	Metals, Wet Chemistry
RMW-10DUP	L2439714-01DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks:	FB_07152024
Field Duplicate pair:	RMW-10, DUP_07152024_3

The above-listed water samples were collected on July 15, 2024 and were analyzed for metals by SW-846 methods 6020B and 7470A, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
ICB/CCB	Thallium	0.239 ug/L	0.001195 mg/L	RMW-10

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

No positive results were found in the field blank sample FB_07152024 for metals analyses.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_07152024 for wet chemistry analyses.

MS/MSD Results

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

Laboratory duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

Serial Dilution

Metals

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

Samples RMW-10 and DUP_07152024_3 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Metals

Analyte	Concentration (mg/L)		RPD
	RMW-10	DUP_07152024_3	
Aluminum	0.00839	0.00790	6
Antimony	0.00077	0.00042U	Not calculable
Arsenic	0.00206	0.00215	4
Barium	0.04254	0.04289	1
Calcium	19.4	18.4	5

Analyte	Concentration (mg/L)		RPD
	RMW-10	DUP_07152024_3	
Iron	0.566	0.567	0
Magnesium	8.02	8.15	2
Manganese	0.1767	0.1752	1
Potassium	2.34	2.26	3
Sodium	4.31	4.35	1
Zinc	0.00341U	0.01576	Not calculable

Wet Chemistry

No results were detected in any of the samples.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Dilutions were not required for metals and wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025

Reviewer: NC
2nd Reviewer:

Method: Metals (EPA 6020B); Mercury (EPA 7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	ICP/MS Tune	A	
III	Initial Calibration	A	
IV	ICV/Continuing Calibration	A	
V	ICP Interference Check Sample Analysis	A	
VI	Laboratory Blanks	SW	
VII	Field Blank	ND	FB = FB_07152024
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Duplicate	N	
X	Serial Dilution	A	
XI	Laboratory Control Sample	A	LCS
XII	Internal Standards (ICP-MS)	A	
XIII	Field Duplicate	SW	(1, DUP_07152024_3)
XIV	Target Analyte Quantitation	A	MDL<samples<RL
XV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	water	6020B	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7470A	Hg
QC			
2, 3	water	6020B	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7470A	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.	YES			
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?	YES			
Were %RSDs of isoptoes in the tuning solution ≤5%?	YES			
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	Not provided/not reviewed
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
X. Serial Dilution				
Were all percent differences <10%?	YES			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		NO		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?	YES			
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?	YES			
If the recoveries were outside the limits, was a reanalysis performed?	YES			
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?			NA	
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/L Associated Samples: All

				Sample Identification				
Analyte	**PB (mg/L)**	**Maximum ICB/CCB (ug/L)**	**Action Level (mg/L)**					
Tl		0.239	0.001195					

Comments: The listed analyte concentration is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

Method: Metals

Analyte	Concentration (mg/L)		RPD
	1	DUP_07152024_3	
Aluminum	0.00839	0.00790	6
Antimony	0.00077	0.00042U	NC
Arsenic	0.00206	0.00215	4
Barium	0.04254	0.04289	1
Calcium	19.4	18.4	5
Iron	0.566	0.567	0
Magnesium	8.02	8.15	2
Manganese	0.1767	0.1752	1
Potassium	2.34	2.26	3
Sodium	4.31	4.35	1
Zinc	0.00341U	0.01576	NC

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (mg/L)	True (mg/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
R1854596-1 ICV	ICPMS	Cu	50.902	50.0	101.804	102	Y
R1854596-25 CCV	ICPMS	Ag	60.762	60.0000	101.27	101	Y
R1854596-3 ICSA	ICPMS	K	100385.2430	100000	100.385243	100	Y
R1854687-1 ICV	CVAA	Hg	0.002917	0.00300	97.23333333	97	Y
R1854687-13 CCV	CVAA	Hg	0.004699	0.0050	93.98	94	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
R1854596-8 TUNE	Mass Axis	59	58.9260	± 0.1 amu
R1854596-8 TUNE	%RSD	238	1.1	≤ 5%

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG1947691-2	LCS	Hg	0.000952	0.00100	95.2	95	Y
2	MS	Hg	0.004735	0.005	94.7	95	Y
2, 3	MS/MSD RPD	As	0.12199	0.12259	0.49063701	0	Y
1	Serial dilution	Ca	19.371252	19.037435	1.723259808	2	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Initial volume)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Volume (mL)	Final Volume (mL)	Reported Result (mg/L)	Recalcuated Result (mg/L)	Acceptable (Y/N)
1	Ca	19371.252	1	50	50	19.4	19.371252	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951W
SDG #: L2439714
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1
Reviewer: NC
2nd Reviewer:

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB _07152024
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	ND	(1, DUP_07152024_3)
X	Target Analyte Quantitation	A	
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10	L2439714-01		Water	07/15/2024	Category B
2	RMW-10MS	L2439714-01MS	MS	Water	07/15/2024	Category B
3	RMW-10MSD	L2439714-01MSD	MSD	Water	07/15/2024	Category B
4	RMW-10DUP	L2439714-01DUP	DUP	Water	07/15/2024	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Cr(VI), Cyanide
QC	
2, 3	Cr(VI), Cyanide
4	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	Yes			
II/III Calibration				
Were all instruments calibrated at the required frequency?	Yes			
Were the proper number of standards used?	Yes			
Were all initial and continuing calibration verifications within the QC limits?	Yes			
Were all initial calibration correlation coefficients within limits as specifed by the method?	Yes			
Were balance checks performed as required?			NA	
IV Blanks				
Was a method blank associated with every sample in this SDG?	Yes			
Was there contamination in the method blanks?		No		
Was there contamination in the initial and continuing calibration blanks?		No		
V. Field Blanks				
Were field blanks identified in this SDG?	Yes			
Were target analytes detected in the field blanks?		No		
VI. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	Yes			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	Yes			

VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	Yes			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	Yes			
IX. Field Duplicates				
Were field duplicates identifed in this SDG?	Yes			
Were target analytes detected in the field duplicates?		No		
X. Sample Result Verification				
Were all reporting limits adjusted to reflect sample dilutions?	Yes			
Were all soil samples dry weight corrected?			NA	
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	Yes			

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.

Calibration date: 3/7/2024

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0	0.999925	0.999925	Y
		s2	0.005	0.012			
		s3	0.01	0.02			
		s4	0.02	0.039			
		s5	0.05	0.091			
		s6	0.1	0.18			
		s7	0.2	0.358			
		s8	0.5	0.867			
		s9					
		s10					
		s11					
		s12					

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.193	0.20		96.5	97	Y
Calibration verification	Cyanide	5.39084	5.00		107.8168	108	Y
Calibration verification	Cyanide	5.39528	5.00		107.9056	108	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG1947542-2	LCS	Cr(VI)	0.1932445	0.200	96.62225	96	Y
2	MS	Cyanide	0.20439	0.2	102.195	102	Y
2, 3	MS/MSD RPD	Cr(VI)	0.09568855	0.09742031	1.793558307	1	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Volume (mL)	Final Volume (mL)	Reported Result (mg/L)	Recalculated Result (mg/L)	Acceptable (Y/N)
1	Cyanide	0.00110	1	50	50	0.001U	0.0011	Y
1	Cr(VI)	0.000	1	50	50	0.003U	0	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2439718
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
RMW-10_P	L2439718-01	PFAS
RMW-10_PMS	L2439718-01MS	PFAS
RMW-10_PMSD	L2439718-01MSD	PFAS

Associated QC Samples(s):

Field/Trip Blanks:	FB_07152024_P, EB_07152024_P
Field Duplicate pair:	RMW-10_P, DUP_07152024_B_P

The above-listed soil samples were collected on July 15, 2024 and was analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB_07152024_P and equipment blank sample EB_07152024_P for PFAS analysis.

MS/MSD Results

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
RMW-10_PMS/MSD (RMW-10_P)	1H,1H,2H,2H-Perfluorooctanesulfonlc acid (6:2FTS)	32	J (all detects)

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples RMW-10_P and DUP_07152024_B_P were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ng/L)		RPD
	RMW-10 P	DUP 07152024 B P	
Perfluorobutanoic Acid (PFBA)	3.13	3.18	2
Perfluoropentanoic Acid (PFPeA)	3.20	2.96	8
Perfluorobutanesulfonic Acid (PFBS)	1.28	1.24	3
Perfluorohexanoic Acid (PFHxA)	10.2	8.78	15
Perfluoroheptanoic Acid (PFHpA	3.32	2.96	11
Perfluorohexanesulfonic Acid (PFHxS)	1.11	1.15	4
Perfluorooctanoic Acid (PFOA)	11.5	10.9	5
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	74.9	62.7	18
Perfluorononanoic Acid (PFNA)	0.941	1.04	10
Perfluorooctanesulfonic Acid (PFOS)	11.0	9.95	10

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60951X
SDG #: L2439718
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 4/30/2025
Page: 1 of 1
Reviewer: JV
2nd Reviewer: Q

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	LC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration/ISC/Bile Salt	A	CCV ≤ 30% ISC ≤ 30%
V	Laboratory Blanks	A	FB = FB-07152024_P (same SDG)
VI	Field Blank	ND	EB = EB_
VII	Matrix spike/Matrix spike duplicates	SW	
VIII	Laboratory Control Sample	A	LCS, LL_LCS
IX	Field Duplicate	SW	D = 1/DUP_07152024_B_P (same SDG)
X	Internal standards	A	EIS, NIS
XI	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-10_P	L2439718-01		Water	07/15/2024	Category B
2	RMW-10_PMS	L2439718-01MS	MS	Water	07/15/2024	Category B
3	RMW-10_PMSD	L2439718-01MSD	MSD	Water	07/15/2024	Category B

Notes:

WG1949587-1 BLK		

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	√			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			√	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	√			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were the retention time windows properly established?	√			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) of the initial calibration verification < 30%?	√			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	√			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	√			
Were all the retention times within the acceptance windows?	√			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	√			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) within limits?	√			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	√			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	√			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?			√	
Did reported results include both branched and linear isomers?	√			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	√			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	√			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	√			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	√			
Were ion ratios between 50-150%?	√			
Were manual integrations reviewed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: LC/MS PFAS (EPA Method 1633)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2FTS)				32	30	1 (Det)	J det/A

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: LC/MS PFAS (EPA Method 1633)

Compound	Concentration (ng/L)		RPD
	1	DUP_07152024_B_P	
Perfluorobutanoic Acid (PFBA)	3.13	3.18	2
Perfluoropentanoic Acid (PFPeA)	3.20	2.96	8
Perfluorobutanesulfonic Acid (PFBS)	1.28	1.24	3
Perfluorohexanoic Acid (PFHxA)	10.2	8.78	15
Perfluoroheptanoic Acid (PFHpA	3.32	2.96	11
Perfluorohexanesulfonic Acid (PFHxS)	1.11	1.15	4
Perfluorooctanoic Acid (PFOA)	11.5	10.9	5
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	74.9	62.7	18
Perfluorononanoic Acid (PFNA)	0.941	1.04	10
Perfluorooctanesulfonic Acid (PFOS)	11.0	9.95	10

LDC #: 60951X

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound
S= Standard deviation of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF 2.5/2.32	Recalculated RRF 2.5/2.32	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL LCMS05	7/22/2024	PFOA (M8-PFOA)	0.530	0.531	0.580	0.580	11.79	11.55
			PFOS (M8-PFOS)	1.010	1.011	1.104	1.104	12.09	12.16

LDC #: 60951X

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Conc	Reported Conc (CCV)	Recalculated Conc (CCV)	Reported %R	Recalculated %R
1	SCI05_240725_84	7/25/2024	PFOA (M8-PFOA)	2.500	2.114	2.114	84.6	84.6
			PFOS (M8-PFOS)	2.320	2.130	2.130	91.8	91.8

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

METHOD: LC/MS PFAS (EPA Method 1633)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA
Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added
RPD = | MS - MSD | * 2/(MS + MSD)
MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID:___2/3_____

Compound	SA (ng/L)		SC (ng/L)	SSC (ng/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	18.2	18.0	11.5	29.1	28.3	96	97	94	93	3	3
PFOS	16.9	16.7	11.0	27.8	26.8	99	99	95	95	4	4

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: LC/MS PFAS (EPA Method 1633)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG1949887-3 LCS

Compound	SA (ng/L)		SSC (ng/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
					Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	20.0	NA	18.4	NA	92	92				
PFOS	18.6	NA	18.1	NA	98	97				

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: LC/MS PFAS (EPA Method 1633)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vf = Final volume extract
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Cis (ng/mL)	RRF	DF	Vf (mL)	Vo (Kg)	% S/100	Calculated Concentration (ng/L)	Reported Concentration (ng/L)	% Diff
1	PFOA	403792	1114002	2.500	0.580	1.000	4.0	0.54429	NA	11.48	11.50	0

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Terraphase
222 International Drive, Suite 150
Portsmouth, NJ 03801
ATTN: Ms. Madison Ingling
madison.ingling@terraphase.com

June 16, 2025

SUBJECT: Elmwood Preserve - Data Validation

Dear Ms. Ingling,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on April 30, 2025. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #60984:

SDG #	**Fraction**
L2505783, L2506139, L2506464, L2506645, L2507419, L2511469	Pesticide, Metals, VOC, SVOC, Pesticide, PCB, Herbicide, Wet Chemistry, PFAS

The data validation was performed under Category B guidelines. The analysis was validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan, Elmwood Preserve (January 2025)
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005 (November 2020)
- USEPA National Functional Guidelines for Inorganic Superfund Data Review, EPA 542-R-20-006 (November 2020)
- Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager

LDC #60984 (Terraphase - Portsmouth, NJ / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	VOCs (8260D)	SVOCs (8270E)	Pesticides (8081B)	PCBs (8082A)	Herbicides (8151A)	PFAS (EPA 1633)
Matrix Type:					Soil	Soil	Soil	Soil	Soil	Soil
A	L2505783	4/30/25	5/21/25	Category B			4			
B	L2506139	4/30/25	5/21/25	Category B	1	2	3	1	1	2
C	L2506464	4/30/25	5/21/25	Category B	2	3	2	1		
D	L2506645	4/30/25	5/21/25	Category B	1	2	2	1		
E	L2507419	4/30/25	5/21/25	Category B			3			
F	L2511469	4/30/25	5/21/25	Category B						1
Total			PM: PG		**4**	**7**	**14**	**3**	**1**	**3**

LDC #60984 (Terraphase - Portsmouth, NJ / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	Metals (6010D)	(3) Metals (6010D)	(2) Metals (6010D)	Mercury (7470A)	Mercury (7471B)	Cr(VI) (7196A)
Matrix Type:					Soil	Soil	Soil	Soil	Soil	Soil
A	L2505783	4/30/25	5/21/25	Category B		1			1	1
B	L2506139	4/30/25	5/21/25	Category B	2				2	1
C	L2506464	4/30/25	5/21/25	Category B	2				2	3
D	L2506645	4/30/25	5/21/25	Category B	2				2	2
E	L2507419	4/30/25	5/21/25	Category B			2	2		1
F	L2511469	4/30/25	5/21/25	Category B						
Total			PM: PG		**6**	**1**	**2**	**2**	**7**	**8**

These sample counts do not include MS/MSD, and DUPs.
EDD: EQuIS
NYDUSR Project# CV04.001.005 (WO 20250428); Category B (10% or 1 per SDG)

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2505783
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I13R-0.5-1	L2505783-01	Pesticide
I10R-0.5-1	L2505783-21	Pesticide
I12R-0.5-1	L2505783-36	Pesticide
I13R-0.5-1DL	L2505783-01DL	Pesticide

Associated QC Samples(s):

Field/Trip Blanks: FB-250203
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 3, 2025 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
02/08/25	wg2028139-1	CLP2	Methoxychlor	21.1	I12R-0.5-1	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250203 for pesticide analysis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG2026804-2,3 LCS/LCSD (I10R-0.5-1)	delta-BHC	167 (30-150)	156 (30-150)	None

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG2027505-2,3 LCS/LCSD (I13R-0.5-1)	Heptachlor epoxide	51	J (all detects)
	Dieldrin	50	J (all detects)
	4,4'-DDE	51	J (all detects)
	4,4'-DDD	48	J (all detects)
	4,4'-DDT	48	J (all detects)
	cis-Chlordane	46	J (all detects)
	trans-Chlordane	46	J (all detects)

LCS ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
WG2027505-2,3 LCS/LCSD (I13R-0.5-1)	delta-BHC	50	None
	Lindane	52	
	alpha-BHC	52	
	beta-BHC	47	
	Heptachlor	47	
	Aldrin	52	
	Endrin	50	
	Endrin aldehyde	46	
	Endrin ketone	45	
	Endosulfan I	50	
	Endosulfan II	48	
	Endosulfan sulfate	47	
	Methoxychlor	43	

No data were qualified due to high RPDs when the associated results were non-detected.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the pesticide analysis.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Pesticide Analysis Reported
I13R-0.5-1DL	50-fold dilution due to nature of sample matrix

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
I13R-0.5-1	4,4'-DDD cis-Chlordane trans-Chlordane	55 82 57	J (all detects) J (all detects) J (all detects)
I10R-0.5-1	Heptachlor epoxide cis-Chlordane trans-Chlordane	44 96 53	J (all detects) J (all detects) J (all detects)
I12R-0.5-1	4,4'-DDT cis-Chlordane	45 119	J (all detects) J (all detects)

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Validation Action
I13R-0.5-1	Dieldrin 4,4'-DDE 4,4'-DDT	Results exceeded calibration range.	Not reportable

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984A
SDG #: L2505783 Servicca
Laboratory: ~~Alpha~~ Pace Analytical, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: CF

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% or ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250203 (same SDG)
VII	Surrogate Spikes /IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS LCSD
IX	Laboratory Control Sample	SW	
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	SW	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I13R-0.5-1	L2505783-01		Soil	02/03/2025	Category B
2	I10R-0.5-1	L2505783-21		Soil	02/03/2025	Category B
3	I12R-0.5-1	L2505783-36		Soil	02/03/2025	Category B
	1DL 50X	↓ -01 DL				

Notes:

- 1.	WG2027505-1 Blk	(1)	
- 2.	WG2026804-1	(2)	
- 3.	WG2028018-1	(3)	

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. trans–Heptachlor epoxide
B. beta-BHC	L. Endosulfan II	V. Aroclor 1016	FF. Hexachlorobenzene	PP. Mirex
C. delta-BHC	M. 4,4'-DDD	W. Aroclor 1221	GG. Chlordane	QQ cis-Chlordane
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor 1232	HH. Chlordane (Technical)	RR. trans-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor 1242	II. Aroclor 1262	SS. Hexachlorobutadiene
F. Aldrin	P. Methoxychlor	Z. Aroclor 1248	JJ. Aroclor 1268	TT. Kepone
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor 1254	KK. Oxychlordane	UU. Chlorpyrifos
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor 1260	LL. trans-Nonachlor	VV
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. cis-Nonachlor	WW.
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. cis–Heptachlor epoxide	XX.

Notes:_____

LDC#: 60984A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
P18	2/8/2025	wg2028139-1	CLP2	Methoxychlor	21.1	3, MB3 (ND)	J/UJ/A

LDC#: 60984A

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.
Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
WG2027505-2,3 LCS/D	See attached					30	1, MB1 (ND+DET)	J det/P
WG2026804-2,3 LCS/D	Delta-BHC	167	156	30-150			2, MB2 (ND)	J det/P

Laboratory Control Sample Summary
Form 3
Pesticides

Client	: Terraphase Engineering Inc.	**Lab Number**	: L2505783
Project Name	: ELMWOOD PRESERVE	**Project Number**	: CV04.001
Matrix (Level)	: SOIL (LOW)		
LCS Sample ID	: WG2027505-2 **Analysis Date** : 02/08/25 11:38	**File ID**	: 18250208a-07
LCSD Sample ID	: WG2027505-3 **Analysis Date** : 02/08/25 11:49	**File ID**	: 18250208a-08

		Laboratory Control Sample			Laboratory Control Duplicate						
Parameter		True (ug/kg)	Found (ug/kg)	%R	True (ug/kg)	Found (ug/kg)	%R	RPD		Recovery Limits	RPD Limit
Delta-BHC	C	33.2	14.8	45	32.6	24.4	75	50	Q	30-150	30
Lindane		33.2	15.5	47	32.6	26.0	80	52	Q	30-150	30
Alpha-BHC	A	33.2	15.8	48	32.6	26.8	82	52	Q	30-150	30
Beta-BHC	B	33.2	15.1P	46	32.6	24.3P	74	47	Q	30-150	30
Heptachlor	E	33.2	15.5	47	32.6	24.8	76	47	Q	30-150	30
Aldrin	F	33.2	15.2	46	32.6	25.3	78	52	Q	30-150	30
Heptachlor epoxide	G	33.2	12.8	39	32.6	21.5	66	51	Q	30-150	30
Endrin	K	33.2	16.5	50	32.6	27.0	83	50	Q	30-150	30
Endrin aldehyde	R	33.2	13.1	40	32.6	20.9	64	46	Q	30-150	30
Endrin ketone	Q	33.2	16.6	50	32.6	25.9	79	45	Q	30-150	30
Dieldrin	I	33.2	15.5	47	32.6	25.3	78	50	Q	30-150	30
4,4'-DDE	J	33.2	14.6	44	32.6	24.2	74	51	Q	30-150	30
4,4'-DDD	M	33.2	16.5	50	32.6	26.8	82	48	Q	30-150	30
4,4'-DDT	O	33.2	16.7	50	32.6	26.9	82	48	Q	30-150	30
Endosulfan I	H	33.2	14.9	45	32.6	24.4	75	50	Q	30-150	30
Endosulfan II	L	33.2	15.7	47	32.6	25.1	77	48	Q	30-150	30
Endosulfan sulfate	N	33.2	15.1	46	32.6	24.2	74	47	Q	30-150	30
Methoxychlor	P	33.2	14.9	45	32.6	22.9	70	43	Q	30-150	30
cis-Chlordane	QQ	33.2	14.8	45	32.6	23.6	72	46	Q	30-150	30
trans-Chlordane	RR	33.2	16.6	50	32.6	26.2	80	46	Q	30-150	30

LDC#: 60984A

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	1	4,4'-DDD	55	J det/A
		cis-Chlordane	82	
		trans-Chlordane	57	
	2	Heptachlor Epoxide	44	
		cis-Chlordane	96	
		trans-Chlordane	53	
	3	4,4'-DDT	45	
		cis-Chlordane	119	

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
All available information pertaining to the data were reviewed for data quality, uncertainty and bias using professional judment to compliment the overall assessment made below.

#	Sample ID	Analyte	Findings	Qualifications
	1	Dieldrin	> cal range	NR
		4,4'-DDE		
		4,4'-DDT		

LDC# 60984A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	1/3/2025	Dieldrin (CLP1)	1.164	1.164	1.238	1.239	7.32	7.31
			Dieldrin (CLP2)	1.122	1.122	1.141	1.141	2.39	2.39
			4,4'-DDT (CLP1)	1.044	1.044	1.094	1.094	2.38	5.72
			4,4'-DDT (CLP2)	1.019	1.018	1.032	1.032	2.63	2.63
2	ICAL PEST15	1/27/2025	Dieldrin (CLP1)	1.241	1.241	1.323	1.323	10.82	10.81
			Dieldrin (CLP2)	1.313	1.313	1.349	1.349	7.65	7.65
			4,4'-DDT (CLP1)	0.941	0.941	0.993	0.993	12.07	12.07
			4,4'-DDT (CLP2)	0.876	0.875	0.933	0.933	12.58	12.57
3	ICAL PEST18	1/30/2025	Dieldrin (CLP1)	1.284	1.284	1.390	1.390	13.65	13.65
			Dieldrin (CLP2)	1.194	1.194	1.226	1.226	3.99	3.98
			4,4'-DDT (CLP1)	1.135	1.136	1.050	1.050	12.97	12.97
			4,4'-DDT (CLP2)	1.093	1.093	1.119	1.119	3.79	3.79

LDC# 60951A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	wg2026936-1 PEST15	02/05/25 5:35	Dieldrin (CLP1)	1.323	1.385	1.385	4.7	4.7
			Dieldrin (CLP2)	1.349	1.510	1.510	11.9	11.9
			4,4'-DDT (CLP1)	0.993	0.840	0.840	15.4	15.4
			4,4'-DDT (CLP2)	0.933	0.870	0.870	6.8	6.8
2	wg2028491-1 PEST15	02/10/25 9:48	Dieldrin (CLP1)	1.323	1.412	1.412	6.7	6.7
			Dieldrin (CLP2)	1.349	1.602	1.602	18.8	18.8
			4,4'-DDT (CLP1)	0.993	0.933	0.933	6.0	6.0
			4,4'-DDT (CLP2)	0.933	0.911	0.911	2.4	2.4
3	wg2028139-1 PEST18	02/08/25 10:50	Dieldrin (CLP1)	1.390	1.423	1.423	2.4	2.4
			Dieldrin (CLP2)	1.226	1.289	1.289	5.1	5.1
			4,4'-DDT (CLP1)	1.050	0.910	0.910	13.3	13.3
			4,4'-DDT (CLP2)	1.119	0.920	0.920	17.8	17.8
4	wg2028477-4 PEST20	02/10/25 12:12	Dieldrin (CLP1)	1.238	1.377	1.377	11.2	11.2
			Dieldrin (CLP2)	1.141	1.349	1.349	18.2	18.2
			4,4'-DDT (CLP1)	1.094	1.121	1.121	2.5	2.5
			4,4'-DDT (CLP2)	1.032	1.098	1.098	6.5	6.5

LDC # 60984A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____(1x)

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	23.31	47	47	0
Tetrachloro-m- xylene	CLP2	50.0	22.03	44	44	0
Decachlorobiphenyl	CLP1	50.0	46.62	93	93	0
Decachlorobiphenyl	CLP2	50.0	44.06	88	88	0

LDC # 60984A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2027505-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	50.0	50.0	23.4	39.8	47	47	80	80	52	52
DDT	50.0	50.0	25.1	41.3	50	50	82	83	48	49

LDC # 60984A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDT	2386200000	176200000	25.000	1.0320	10.00	15.30	50.00	0.820	13074.5	13100.0	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2505783
Reviewer:	Skylar Gerace and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
I12R-0.5-1	L2505783-36	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-250203
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 3, 2025 and were analyzed for metals by SW-846 methods 6010D and 7471B and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250203 for metals and wet chemistry analyses.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

No results were reported below the RL and above the MDL in the metals and wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
I12R-0.5-1	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984A
SDG #: L2505783
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250203
VII	Matrix Spike/Matrix Spike Duplicate	~~A~~ N	~~WG2034869-3~~
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < no samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12R-0.5-1 DF = 2 (matrix) (all except Hg)	L2505783-36		Soil	02/03/2025	Category B

Notes:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
Were all water samples preserved to a pH of <2.			x	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			x	
Were %RSDs of isoptoes in the tuning solution ≤5%?			x	
III./IV. Calibration				
Were all instruments calibrated daily?	x			
Were the proper standards used?	x			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	x			
Were the low level standard checks within 70-130%?			x	
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
V. Interference Check Sample				
Were the interference check samples performed daily?	x			
Were the AB solution recoveries within 80-120%?			x	
VI. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
VII. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?		x		

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			x	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			x	
X. Serial Dilution				
Were all percent differences <10%?			x	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			x	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			x	
If the recoveries were outside the limits, was a reanalysis performed?			x	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	s	6010D	As, Cr
1	s	7471B	Hg

Comments:

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	As	0.474	0.5	94.8	95	Y
CCV	ICP	Cr	0.507	0.5	101.4	101	Y
ICV	CVAA	Hg	0.003	0.003	100	100	Y
CCV	CVAA	Hg	0.0099	0.01	99	99	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG2034869-2	LCS	Hg	1.57	1.67	94.01197605	94	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	As	0.7272	2	1.276	50	85	67	67.04775954	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984A
SDG #: L2505783
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB250203
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No dilutions, MDL<no samples <RL
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	I12R-0.5-1	L2505783-36		Soil	02/03/2025	Category B

Notes:

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	x			
Were the proper number of standards used?	x			
Were all initial and continuing calibration verifications within the QC limits?	x			
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
Were balance checks performed as required?	x			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
V. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?		x		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			x	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			x	
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Cr(VI)

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/kg)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/kg)	True (mg/kg)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.211	0.2		105.5	105	Y
Calibration verification	Cr(VI)	0.209	0.2		104.5	105	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG2026488-2	LCS	Cr(VI)	109	104	104.8076923	105	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0	1	2.4783	100	85	ND	0	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2506139
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 10, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
TEI-SB-02-6-8	L2506139-34	VOC, SVOC, Pesticide, PCB, Herbicide, PFAS
TS-10R-0-1	L2506139-46	SVOC, Pesticide
TS-03R-0-1	L2506139-56	Pesticide, PFAS
TEI-SB-02-6-8MS	L2506139-34MS	VOC, SVOC, Pesticide, PCB, Herbicide, PFAS
TEI-SB-02-6-8MSD	L2506139-34MSD	VOC, SVOC, Pesticide, PCB, Herbicide, PFAS

Associated QC Samples(s):

Field/Trip Blanks: TB-250204, FB-250204
Field Duplicate pair: TEI-SB-02-6-8 and DUP-01

The above-listed soil samples were collected on February 4, 2025 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, herbicides by SW-846 method 8151A, and perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB, Herbicide

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
01/22/25	ICAL VOA110	1,4-Dioxane	0.002 (≥0.005)	TEI-SB-02-6-8	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
01/22/25	V10250122A18.D	1,4-Dioxane	31.700	TEI-SB-02-6-8	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/10/25	V10250210A02.D	Dichlorodifluoromethane	25.6	TEI-SB-02-6-8	UJ (all non-detects)
		Bromomethane	49.2		UJ (all non-detects)
		Trichlorofluoromethane	20.9		UJ (all non-detects)
		Ethyl ether	38.4		UJ (all non-detects)
		1,1-Dichloroethene	31.9		UJ (all non-detects)
		Carbon disulfide	30.8		UJ (all non-detects)
		Acrylonitrile	21.9		UJ (all non-detects)
		Vinyl acetate	24.3		UJ (all non-detects)
		n-Butylbenzene	22.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
02/10/25	V10250210A02.D	1,4-Dioxane	0.00224 (≥0.005)	TEI-SB-02-6-8	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/07/25	ABN0207.D	Hexachlorocyclopentadiene	29.4	TEI-SB-02-6-8	UJ (all non-detects)
		4,6-Dinitro-o-cresol	27.7		UJ (all non-detects)
02/08/25	ABN0207.D	Bis(2-chloroisopropyl)ether	34.1	TS-10R-0-1	UJ (all non-detects)
		4,6-Dinitro-o-cresol	23.7		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide, PCB, Herbicide, PFAS

All criteria were met.

Blanks

VOC

Contamination was detected in the associated VOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG2028945-5BLANK	Bromomethane	1.0 ug/Kg	RL	TEI-SB-02-6-8

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the trip blank sample TB-250204 for VOC analysis.

Contamination was detected in the field blank sample FB-250204 for VOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-250204	Acetone	2.5 ug/L	RL	TEI-SB-02-6-8

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

SVOC, Pesticide, PCB, Herbicide, PFAS

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250204 for SVOC, pesticide, PCB, herbicide, and PFAS analyses.

Surrogate Recoveries

Pesticide

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Column	Surrogate	%R (Limits)	Affected Analyte	Validation Action
TS-10R-0-1	Col 1	Decachlorobiphenyl	29 (30-150)	All pesticides	J (all detects) UJ (all non-detects)

VOC, SVOC, PCB, Herbicide

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TEI-SB-02-6-8MS/MSD (TEI-SB-02-6-8)	Chloroform	69 (70-130)	66 (70-130)	J (all detects)
	1,2-Dichloropropane	-	64 (70-130)	UJ (all non-detects)
	Dibromochloromethane	52 (70-130)	47 (70-130)	
	1,1,2-Trichloroethane	61 (70-130)	54 (70-130)	
	Tetrachloroethene	61 (70-130)	61 (70-130)	
	Chlorobenzene	56 (70-130)	52 (70-130)	
	1,2-Dichloroethane	64 (70-130)	56 (70-130)	
	Bromodichloromethane	60 (70-130)	53 (70-130)	
	trans-1,3-Dichloropropene	59 (70-130)	52 (70-130)	
	cis-1,3-Dichloropropene	63 (70-130)	55 (70-130)	
	Bromoform	46 (70-130)	39 (70-130)	
	1,1,2,2-Tetrachloroethane	57 (70-130)	48 (70-130)	
	Toluene	64 (70-130)	62 (70-130)	
	Ethylbenzene	58 (70-130)	56 (70-130)	
	Trichloroethene	69 (70-130)	68 (70-130)	
	1,2-Dichlorobenzene	46 (70-130)	37 (70-130)	
	1,3-Dichlorobenzene	45 (70-130)	37 (70-130)	
	1,4-Dichlorobenzene	44 (70-130)	36 (70-130)	
	Methyl-tert-butyl ether	62 (70-130)	52 (66-130)	
	m,p-Xylene	57 (70-130)	54 (70-130)	
	o-Xylene	56 (70-130)	52 (70-130)	
	cis-1,2-Dichloroethene	66 (70-130)	62 (70-130)	
	Dibromomethane	59 (70-130)	51 (70-130)	
	Styrene	55 (70-130)	49 (70-130)	
	Acetone	52 (54-140)	-	
	2-Butanone	-	58 (70-130)	
	Vinyl acetate	30 (70-130)	12 (70-130)	
	4-Methyl-2-pentanone	64 (70-130)	53 (70-130)	
	1,2,3-Trichloropropane	58 (68-130)	48 (68-130)	
	2-Hexanone	60 (70-130)	50 (70-130)	
	Bromochloromethane	59 (70-130)	51 (70-130)	

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TEI-SB-02-6-8MS/MSD (TEI-SB-02-6-8) (continued)	1,2-Dibromoethane	59 (70-130)	52 (70-130)	J (all detects) UJ (all non-detects)
	1,3-Dichloropropane	61 (69-130)	54 (69-130)	
	1,1,1,2-Tetrachloroethane	56 (70-130)	52 (70-130)	
	Bromobenzene	48 (70-130)	41 (70-130)	
	n-Butylbenzene	48 (70-130)	38 (70-130)	
	sec-Butylbenzene	52 (70-130)	46 (70-130)	
	tert-Butylbenzene	52 (70-130)	47 (70-130)	
	2-Chlorotoluene	50 (70-130)	45 (70-130)	
	4-Chlorotoluene	48 (70-130)	41 (70-130)	
	1,2-Dibromo-3-chloropropane	47 (68-130)	39 (68-130)	
	Hexachlorobutadiene	34 (67-130)	24 (67-130)	
	Isopropylbenzene	56 (70-130)	52 (70-130)	
	p-Isopropyltoluene	48 (70-130)	41 (70-130)	
	Naphthalene	46 (70-130)	36 (70-130)	
	Acrylonitrile	-	59 (70-130)	
	n-Propylbenzene	52 (70-130)	47 (70-130)	
	1,2,3-Trichlorobenzene	39 (70-130)	29 (70-130)	
	1,2,4-Trichlorobenzene	39 (70-130)	30 (70-130)	
	1,3,5-Trimethylbenzene	51 (70-130)	45 (70-130)	
	1,2,4-Trimethylbenzene	49 (70-130)	41 (70-130)	
	p-Diethylbenzene	45 (70-130)	36 (70-130)	
	p-Ethyltoluene	49 (70-130)	43 (70-130)	
	1,2,4,5-Tetramethylbenzene	43 (70-130)	33 (70-130)	
	trans-1,4-Dichloro-2-butene	56 (70-130)	47 (70-130)	

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
TEI-SB-02-6-8MS/MSD	Vinyl acetate	87	None
(TEI-SB-02-6-8)	Hexachlorobutadiene	34	

No data were qualified due to high RPDs when the associated results were non-detected.

SVOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TEI-SB-02-6-8MS/MSD (TEI-SB-02-6-8)	Hexachlorobenzene	35 (40-140)	-	UJ (all non-detects)
	Bis(2-chloroethyl) ether	39 (40-140)	-	UJ (all non-detects)
	2-Chloronaphthalene	38 (40-140)	-	UJ (all non-detects)
	1,2-Dichlorobenzene	38 (40-140)	-	UJ (all non-detects)
	1,3-Dichlorobenzene	37 (40-140)	-	UJ (all non-detects)
	3,3'-Dichlorobenzidine	24 (40-140)	26 (40-140)	UJ (all non-detects)
	Fluoranthene	37 (40-140)	-	UJ (all non-detects)
	4-Chlorophenyl-phenyl ether	35 (40-140)	-	UJ (all non-detects)
	4-Bromophenyl-phenyl ether	34 (40-140)	-	UJ (all non-detects)
	Hexachlorobutadiene	38 (40-140)	-	UJ (all non-detects)
	Hexachlorocyclopentadiene	20 (40-140)	23 (40-140)	UJ (all non-detects)
	Naphthalene	38 (40-140)	-	UJ (all non-detects)
	Bis(2-ethylhexyl)phthalate	36 (40-140)	-	UJ (all non-detects)
	Di-n-butylphthalate	38 (40-140)	-	UJ (all non-detects)
	Di-n-octylphthalate	39 (40-140)	-	UJ (all non-detects)
	Diethylphthalate	37 (40-140)	-	UJ (all non-detects)
	Benzo(a)anthracene	33 (40-140)	38 (40-140)	UJ (all non-detects)
	Benzo(a)pyrene	34 (40-140)	39 (40-140)	UJ (all non-detects)
	Benzo(b)fluoranthene	34 (40-140)	39 (40-140)	UJ (all non-detects)
	Benzo(k)fluoranthene	32 (40-140)	37 (40-140)	UJ (all non-detects)
	Chrysene	33 (40-140)	37 (40-140)	UJ (all non-detects)
	Anthracene	36 (40-140)	-	UJ (all non-detects)
	Benzo(g,h,i)perylene	34 (40-140)	39 (40-140)	UJ (all non-detects)
	Fluorene	35 (40-140)	-	UJ (all non-detects)
	Phenanthrene	35 (40-140)	-	UJ (all non-detects)
	Dibenzo(a,h)anthracene	33 (40-140)	37 (40-140)	UJ (all non-detects)
	Indeno(1,2,3-cd)pyrene	33 (40-140)	38 (40-140)	UJ (all non-detects)
	Dibenzofuran	36 (40-140)	-	UJ (all non-detects)
	2-Methylnaphthalene	35 (40-140)	-	UJ (all non-detects)
	Carbazole	37 (54-128)	45 (54-128)	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB, Herbicide, PFAS

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG2028945-3,4 LCS/LCSD (TEI-SB-02-6-8)	Carbon disulfide Ethyl ether	131 (59-130) 138 (67-130)	- 131 (67-130)	None

Relative percent differences (RPD) were within QC limits.

Herbicide

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Validation Action
WG2027154-2, 3 LCS/LCSD (TEI-SB-02-6-8)	2,4-D	33 (≤30)	None

No data were qualified due to high RPD when the associated results were non-detected.

SVOC, Pesticide, PCB, PFAS

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples TEI-SB-02-6-8 and DUP-01 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

VOC

Analyte	Concentration (ug/Kg)		RPD
	TEI-SB-02-6-8	DUP-01	
Acetone	18	16	12

PFAS

Analyte	Concentration (ug/Kg)		RPD
	TEI-SB-02-6-8	DUP-01	
PFOS	0.070	0.067	4

SVOC, Pesticide, PCB, Herbicide

No results were detected in any of the samples.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the SVOC, pesticide, and PFAS analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, pesticide, PCB, herbicide, and PFAS analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
TS-10R-0-1	4,4'-DDE	45.0	J (all detects)
	trans-Chlordane	200	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139
Laboratory: ~~Pace~~ Alpha Analytical, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	RSD ≤ 20% IAV ≤ 30%
IV	Continuing Calibration	SW	CAV ≤ 20%
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB-250204 (same SDG)
VII	Surrogate Spikes	A	*TB = TB - ↓ ↓
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCSD
X	Field Duplicate	SW	D = 1 / DUP-01 (same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; *ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8	L2506139-34		Soil	02/04/2025	Category B
2	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

WG2028945 - 5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 30%?		√		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?	√			
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2. Methyl isobutyl ketone
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2. 3-Chloro-1-propene
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	1/22/2025	ICAL VOA110	1,4-Dioxane		0.002 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤30%)	Associated samples	Qualifications
	1/22/2025	V10250122A18.D	1,4-Dioxane	31.700	All (ND)	J/UJ/A

	DOD	NFG
%D	20%	30%

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	2/10/2025	V10250210A02.D	Dichlorodifluoromethane	25.6		All (ND)	J/UJ/A
			Bromomethane	49.2			
			Trichlorofluoromethane	20.9			
			Ethyl ether	38.4			
			1,1-Dichloroethene	31.9			
			Carbon disulfide	30.8			
			Acrylonitrile	21.9			
			Vinyl acetate	24.3			
			n-Butylbenzene	22.1			
			~~Naphthalene~~				
			1,4-Dioxane		0.00224 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: ____06/28/24_____ **Associated samples:**_____All (ND)____
Conc. units: __ug/Kg_____

Compound	Blank ID	Sample Identification							
	WG2028945-5BLANK								
Bromomethane	1.0								

Blank analysis date: _____ **Associated samples:**_____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: __JVG__

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 2/4/2025 **Blank units:** ug/L **Associated sample units:** ug/Kg
Field blank type: FB **Associated Samples:** ALL (>RL)

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB-250204								
Acetone	2.5								

Sampling date: _____ **Blank units:** _____ **Associated sample units:** _____

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
2/3	see attached						1 (%R)	J/UJ/A
							↓ (RPD)	J det/A
							(all ND except Acetone)	

2/3

p. 1 of 4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Terraphase Engineering Inc.	**Lab Number**	: L2506139
Project Name	: ELMWOOD PRESERVE	**Project Number**	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	**Matrix (Level)**	: SOIL (LOW)
Lab Sample ID	: L2506139-34	**Analysis Date**	: 02/10/25 14:13
Matrix Spike	: WG2028945-6	**MS Analysis Date**	: 02/10/25 20:58
Matrix Spike Dup	: WG2028945-7	**MSD Analysis Date**	: 02/10/25 21:25

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter		Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
											%R
Methylene chloride		ND	103	76	74	101	76	75	0	70-130	30
1,1-Dichloroethane		ND	103	79	77	101	75	74	5	70-130	30
Chloroform	K	ND	103	71	69 Q	101	66	66 Q	7	70-130	30 J/MJ/A
Carbon tetrachloride		ND	103	76	74	101	77	76	2	70-130	30
1,2-Dichloropropane	Q	ND	103	73	70	101	65	64 Q	11	70-130	30
Dibromochloromethane	T	ND	103	54	52 Q	101	47	47 Q	13	70-130	30
1,1,2-Trichloroethane	U	ND	103	63	61 Q	101	55	54 Q	14	70-130	30
Tetrachloroethene	AA	ND	103	63	61 Q	101	62	61 Q	2	70-130	30
Chlorobenzene	DD	ND	103	57	56 Q	101	53	52 Q	8	70-130	30
Trichlorofluoromethane		ND	103	100	100	101	100	103	1	70-139	30
1,2-Dichloroethane	L	ND	103	66	64 Q	101	56	56 Q	15	70-130	30
1,1,1-Trichloroethane		ND	103	81	78	101	80	79	1	70-130	30
Bromodichloromethane	P	ND	103	62	60 Q	101	54	53 Q	14	70-130	30
trans-1,3-Dichloropropene	W	ND	103	61	59 Q	101	53	52 Q	14	70-130	30
cis-1,3-Dichloropropene	R	ND	103	65	63 Q	101	56	55 Q	16	70-130	30
1,1-Dichloropropene		ND	103	82	79	101	81	80	0	70-130	30
Bromoform	X	ND	103	48	46 Q	101	40	39 Q	19	70-130	30
1,1,2,2-Tetrachloroethane	BB	ND	103	59	57 Q	101	48	48 Q	20	70-130	30
Benzene		ND	103	77	74	101	72	72	6	70-130	30
Toluene	CC	ND	103	66	64 Q	101	63	62 Q	4	70-130	30
Ethylbenzene	EE	ND	103	60	58 Q	101	57	56 Q	6	70-130	30
Chloromethane		ND	103	85	82	101	80	79	6	52-130	30

Matrix Spike Sample Summary
Form 3
Volatiles

2/3

p. 2 of 4

Client	: Terraphase Engineering Inc.	Lab Number	: L2506139
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2506139-34	Analysis Date	: 02/10/25 14:13
Matrix Spike	: WG2028945-6	MS Analysis Date	: 02/10/25 20:58
Matrix Spike Dup	: WG2028945-7	MSD Analysis Date	: 02/10/25 21:25

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
												%R RPD
Bromomethane	ND	103	110	110		101	110	104		7	57-147	30
Vinyl chloride	ND	103	96	93		101	95	94		1	67-130	30
Chloroethane	ND	103	100	101		101	100	99		4	50-151	30
1,1-Dichloroethene	ND	103	110	102		101	100	100		4	65-135	30
trans-1,2-Dichloroethene	ND	103	74	72		101	71	70		4	70-130	30
Trichloroethene S	ND	103	71	69	Q	101	69	68	Q	3	70-130	30 J/UJ/A
1,2-Dichlorobenzene JJJ	ND	103	47	46	Q	101	37	37	Q	23	70-130	30
1,3-Dichlorobenzene FFF	ND	103	47	45	Q	101	38	37	Q	21	70-130	30
1,4-Dichlorobenzene HHH	ND	103	45	44	Q	101	37	36	Q	21	70-130	30
Methyl tert butyl ether LL	ND	103	64	62	Q	101	53	52	Q	18	66-130	30
p/m-Xylene RRR	ND	206	120	57	Q	202	110	54	Q	7	70-130	30
o-Xylene SSS	ND	206	120	56	Q	202	110	52	Q	8	70-130	30
cis-1,2-Dichloroethene QQQ	ND	103	68	66	Q	101	63	62	Q	8	70-130	30
Dibromomethane RR	ND	103	61	59	Q	101	52	51	Q	16	70-130	30
Styrene FF	ND	206	110	55	Q	202	99	49	Q	13	70-130	30
Dichlorodifluoromethane	ND	103	65	63		101	66	66		2	30-146	30
Acetone F	18 (Det)	103	72	52	Q	101	74	56		3	54-140	30
Carbon disulfide	ND	103	100	97		101	92	91		8	59-130	30
2-Butanone M	ND	103	72	70		101	59	58	Q	20	70-130	30
Vinyl acetate HH	ND	103	31	30	Q	101	12	12	Q	87 Q	70-130	30 Jdets/
4-Methyl-2-pentanone Y	ND	103	66	64	Q	101	53	53	Q	21	70-130	30
1,2,3-Trichloropropane XX	ND	103	60	58	Q	101	48	48	Q	21	68-130	30

Matrix Spike Sample Summary
Form 3
Volatiles

2/3

p. 3 of 4

Client	: Terraphase Engineering Inc.	Lab Number	: L2506139
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2506139-34	Analysis Date	: 02/10/25 14:13
Matrix Spike	: WG2028945-6	MS Analysis Date	: 02/10/25 20:58
Matrix Spike Dup	: WG2028945-7	MSD Analysis Date	: 02/10/25 21:25

		Matrix Spike Sample					Matrix Spike Duplicate						
Parameter		Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
												%R	RPD
2-Hexanone	Z	ND	103	62	60	Q	101	51	50	Q	19	70-130	30 J/UJ/A
Bromochloromethane	PP	ND	103	61	59	Q	101	52	51	Q	17	70-130	30
2,2-Dichloropropane		ND	103	73	71		101	74	73		1	70-130	30
1,2-Dibromoethane	TT	ND	103	61	59	Q	101	53	52	Q	15	70-130	30
1,3-Dichloropropane	SS	ND	103	63	61	Q	101	54	54	Q	15	69-130	30
1,1,1,2-Tetrachloroethane	UU	ND	103	57	56	Q	101	53	52	Q	9	70-130	30
Bromobenzene	WW	ND	103	49	48	Q	101	42	41	Q	16	70-130	30
n-Butylbenzene	III	ND	103	49	48	Q	101	39	38	Q	24	70-130	30
sec-Butylbenzene	EEE	ND	103	54	52	Q	101	46	46	Q	15	70-130	30
tert-Butylbenzene	CCC	ND	103	54	52	Q	101	48	47	Q	13	70-130	30
o-Chlorotoluene	ZZ	ND	103	52	50	Q	101	46	45	Q	12	70-130	30
p-Chlorotoluene	BBB	ND	103	49	48	Q	101	41	41	Q	17	70-130	30
1,2-Dibromo-3-chloropropane	MM	ND	103	48	47	Q	101	39	39	Q	22	68-130	30
Hexachlorobutadiene	LLL	ND	103	35	34	Q	101	25	24	Q	34 Q	67-130	30 Jdets
Isopropylbenzene	VV	ND	103	58	56	Q	101	52	52	Q	9	70-130	30
p-Isopropyltoluene	GGG	ND	103	50	48	Q	101	41	41	Q	19	70-130	30
Naphthalene	MMM	ND	103	47	46	Q	101	36	36	Q	26	70-130	30
Acrylonitrile	GGGG	ND	103	73	70		101	60	59	Q	19	70-130	30
n-Propylbenzene	YY	ND	103	54	52	Q	101	47	47	Q	13	70-130	30
1,2,3-Trichlorobenzene	NNN	ND	103	40	39	Q	101	30	29	Q	30	70-130	30
1,2,4-Trichlorobenzene	KKK	ND	103	40	39	Q	101	30	30	Q	29	70-130	30
1,3,5-Trimethylbenzene	AAA	ND	103	52	51	Q	101	45	45	Q	15	70-130	30

Matrix Spike Sample Summary
Form 3
Volatiles

2/3

p. 4 of 4

Client	: Terraphase Engineering Inc.	**Lab Number**	: L2506139
Project Name	: ELMWOOD PRESERVE	**Project Number**	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	**Matrix (Level)**	: SOIL (LOW)
Lab Sample ID	: L2506139-34	**Analysis Date**	: 02/10/25 14:13
Matrix Spike	: WG2028945-6	**MS Analysis Date**	: 02/10/25 20:58
Matrix Spike Dup	: WG2028945-7	**MSD Analysis Date**	: 02/10/25 21:25

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
												3R
1,2,4-Trimethylbenzene bbb	ND	103	50	49	Q	101	41	41	Q	20	70-130	30 J/J/A
1,4-Dioxane	ND	5160	4300	84		5050	3600	71		19	65-136	30
p-Diethylbenzene Z1	ND	103	46	45	Q	101	36	36	Q	24	70-130	30
p-Ethyltoluene VVV	ND	103	51	49	Q	101	44	43	Q	15	70-130	30
1,2,4,5-Tetramethylbenzene A2	ND	103	44	43	Q	101	33	33	Q	29	70-130	30
Ethyl ether	ND	103	82	80		101	70	69		16	67-130	30
trans-1,4-Dichloro-2-butene YYYY	ND	103	57	56	Q	101	47	47	Q	19	70-130	30

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG2028945-3,4 LCS/D	Carbon disulfide	131	-	59-130			All (ND)	J det/P
	Ethyl ether	138	131	67-130				

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound	Concentration (ug/Kg)		RPD
	1	DUP-01	
Acetone	18	16	12

LDC #: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 10 std)	Recalculated RRF (RRF 10 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA110	01/22/25	Acetone (FBZ)	0.078	0.084	0.086	0.086	13.40	13.56
			Ethylbenzene (CBZ)	1.256	1.256	1.338	1.338	13.50	8.58
			Naphthalene (DCB)	2.198	2.198	2.210	2.210	7.88	7.87

LDC #: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V10250210A02.D	02/10/25	Acetone	(FBZ)	0.086	0.099	0.099	15.1	15.1
			Ethylbenzene	(CBZ)	1.338	1.470	1.470	9.9	9.9
			Naphthalene	(DCB)	2.210	2.299	2.299	4.0	4.0

LDC# 60984B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.54	98	98	0
1,2-Dichloroethane-d4	20.0	20.79	104	104	0
Toluene-d8	20.0	19.96	100	100	0
4-Bromofluorobenzene	20.0	18.87	94	94	0

LDC# 60984B

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3___

Compound	SA (ug/L)		SC (ug/L)	SSC (ug/L)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	100.0	100.0	0	102.131	100.349	102	102	100	100	4	2
Benzene	100.0	100.0	0	74.342	71.572	74	74	72	72	6	4
Trichloroethene	100.0	100.0	0	68.626	68.124	69	69	68	68	3	1
Toluene	100.0	100.0	0	63.544	62.488	64	64	62	62	4	2
Chlorobenzene	100.0	100.0	0	55.596	52.513	56	56	52	53	8	6

VALIDATION FINDINGS WORKSHEET

LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 * SSC/SA

Where:

SSC = Spiked concentration

SA = Spike added

LCS = Laboratory control spike recovery

LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2028945-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	52.896	49.495	132	132	124	124	6	7
Benzene	40.00	40.00	43.673	42.208	109	109	106	106	3	3
Trichloroethene	40.00	40.00	42.818	42.233	107	107	106	106	1	1
Toluene	40.00	40.00	42.626	41.351	106	107	103	103	3	3
Chlorobenzene	40.00	40.00	42.954	42.110	107	107	105	105	2	2

VALIDATION FINDINGS WORKSHEET

Sample Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Acetone	12440	190104	20.0	0.086	1.0	5.00	5.10	0.84	17.76	18	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139
Laboratory: ~~Alpha~~ Pace Analytical Services, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: CW

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≥ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250204 (same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	ND	D = 1 / DUP-01 (same SDG)
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8	L2506139-34		Soil	02/04/2025	Category B
2	TS-10R-0-1	L2506139-46		Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
4	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

WG 2027861-1 PBlk		

LDC#: 60984B

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: SVOA (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene (1MDT)	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2. Dibenzo(ah)+(ac)anthracene
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2. Bis(2-ethylhexyl)adipate
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2. p-Chloro-m-cresol
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤ 20%)	RRF (Limits)	Associated samples	Qualifications
	2/7/2025	ABN0207.D	Hexachlorocyclopentadiene	29.4		1, 3, 4, MB1 (ND)	J/UJ/A
			4,6-Dinitro-o-cresol	27.7		↓	↓
	2/8/2025	ABN0207.D	Bis(2-chloroisopropyl)ether	34.1		2 (ND)	
			4,6-Dinitro-o-cresol	23.7		↓	↓

DOD NFG

%D 20%/50% Method criteria RRF: 0.05

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	see attached						1	J/UJ/A
							(All ND)	

3/4

p. 1 of 4

Matrix Spike Sample Summary
Form 3
Semivolatiles

Client	: Terraphase Engineering Inc.	Lab Number	: L2506139
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2506139-34	Analysis Date	: 02/08/25 05:57
Matrix Spike	: WG2027861-4	MS Analysis Date	: 02/08/25 03:07
Matrix Spike Dup	: WG2027861-5	MSD Analysis Date	: 02/08/25 05:33

		Matrix Spike Sample				Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
Acenaphthene	ND	1560	540	35		1580	670	42		21	31-137	50
1,2,4-Trichlorobenzene	ND	1560	590	38		1580	730	46		21	38-107	50
Hexachlorobenzene SS	ND	1560	540	35	Q	1580	680	43		23	40-140	50
Bis(2-chloroethyl)ether B	ND	1560	610	39	Q	1580	760	48		22	40-140	50
2-Chloronaphthalene AA	ND	1560	600	38	Q	1580	750	47		22	40-140	50
1,2-Dichlorobenzene F	ND	1560	590	38	Q	1580	720	45		20	40-140	50
1,3-Dichlorobenzene D	ND	1560	580	37	Q	1580	720	45		22	40-140	50
1,4-Dichlorobenzene	ND	1560	570	36		1580	720	45		23	28-104	50
3,3'-Dichlorobenzidine BBB	ND	1560	370	24	Q	1580	410	26	Q	10	40-140	50
2,4-Dinitrotoluene	ND	1560	710	45		1580	890	56		23	40-132	50
2,6-Dinitrotoluene	ND	1560	690	44		1580	880	56		24	40-140	50
Fluoranthene YY	ND	1560	580	37	Q	1580	700	44		19	40-140	50
4-Chlorophenyl phenyl ether MM	ND	1560	550	35	Q	1580	670	42		20	40-140	50
4-Bromophenyl phenyl ether RR	ND	1560	530	34	Q	1580	660	42		22	40-140	50
Bis(2-chloroisopropyl)ether	ND	1560	630	40		1580	780	49		21	40-140	50
Bis(2-chloroethoxy)methane	ND	1560	630	40		1580	790	50		23	40-117	50
Hexachlorobutadiene U	ND	1560	590	38	Q	1580	710	45		18	40-140	50
Hexachlorocyclopentadiene X	ND	1560	310J	20	Q	1580	360J	23	Q	15	40-140	50
Hexachloroethane	ND	1560	640	41		1580	790	50		21	40-140	50
Isophorone	ND	1560	620	40		1580	760	48		20	40-140	50
Naphthalene S	ND	1560	590	38	Q	1580	720	45		20	40-140	50
Nitrobenzene	ND	1560	700	45		1580	860	54		21	40-140	50

J/WJ/A

Matrix Spike Sample Summary
Form 3
Semivolatiles

Client	: Terraphase Engineering Inc.	**Lab Number**	: L2506139
Project Name	: ELMWOOD PRESERVE	**Project Number**	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	**Matrix (Level)**	: SOIL (LOW)
Lab Sample ID	: L2506139-34	**Analysis Date**	: 02/08/25 05:57
Matrix Spike	: WG2027861-4	**MS Analysis Date**	: 02/08/25 03:07
Matrix Spike Dup	: WG2027861-5	**MSD Analysis Date**	: 02/08/25 05:33

		Matrix Spike Sample				Matrix Spike Duplicate						
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		RPD	Recovery Limits	RPD Limit
NDPA/DPA	ND	1560	560	36		1580	680	43		19	36-157	50
n-Nitrosodi-n-propylamine	ND	1560	630	40		1580	770	49		20	32-121	50
Bis(2-ethylhexyl)phthalate EEE	ND	1560	570	36	Q	1580	690	44		19	40-140	50 J/UJ/A
Butyl benzyl phthalate	ND	1560	640	41		1580	820	52		25	40-140	50
Di-n-butylphthalate XX	ND	1560	600	38	Q	1580	730	46		20	40-140	50
Di-n-octylphthalate FFF	ND	1560	610	39	Q	1580	720	45		17	40-140	50
Diethyl phthalate LL	ND	1560	580	37	Q	1580	720	45		22	40-140	50
Dimethyl phthalate	ND	1560	640	41		1580	810	51		23	40-140	50
Benzo(a)anthracene CCC	ND	1560	510	33	Q	1580	600	38	Q	16	40-140	50
Benzo(a)pyrene III	ND	1560	530	34	Q	1580	620	39	Q	16	40-140	50
Benzo(b)fluoranthene GGG	ND	1560	530	34	Q	1580	620	39	Q	16	40-140	50
Benzo(k)fluoranthene HHH	ND	1560	500	32	Q	1580	580	37	Q	15	40-140	50
Chrysene DDD	ND	1560	510	33	Q	1580	590	37	Q	15	40-140	50
Acenaphthylene	ND	1560	670	43		1580	840	53		23	40-140	50
Anthracene VV	ND	1560	560	36	Q	1580	680	43		19	40-140	50
Benzo(ghi)perylene LLL	ND	1560	530	34	Q	1580	610	39	Q	14	40-140	50
Fluorene NN	ND	1560	550	35	Q	1580	670	42		20	40-140	50
Phenanthrene UU	ND	1560	550	35	Q	1580	670	42		20	40-140	50
Dibenzo(a,h)anthracene KKK	ND	1560	510	33	Q	1580	580	37	Q	13	40-140	50
Indeno(1,2,3-cd)pyrene JJJ	ND	1560	520	33	Q	1580	600	38	Q	14	40-140	50
Pyrene	ND	1560	560	36		1580	700	44		22	35-142	50
Biphenyl	ND	1560	600	38		1580	740	47		21	37-127	50

Matrix Spike Sample Summary
Form 3
Semivolatiles

Client	: Terraphase Engineering Inc.	Lab Number	: L2506139
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	Matrix (Level)	: SOIL (LOW)
Lab Sample ID	: L2506139-34	Analysis Date	: 02/08/25 05:57
Matrix Spike	: WG2027861-4	MS Analysis Date	: 02/08/25 03:07
Matrix Spike Dup	: WG2027861-5	MSD Analysis Date	: 02/08/25 05:33

		Matrix Spike Sample				Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
4-Chloroaniline	ND	1560	660	42		1580	800	51	19	40-140	50
2-Nitroaniline	ND	1560	820	52		1580	1000	63	20	47-134	50
3-Nitroaniline	ND	1560	450	29		1580	550	35	20	26-129	50
4-Nitroaniline	ND	1560	710	45		1580	860	54	19	41-125	50
Dibenzofuran JJ	ND	1560	560	36	Q	1580	690	44	21	40-140	50 J/Q/A
2-Methylnaphthalene W	ND	1560	540	35	Q	1580	660	42	20	40-140	50
1,2,4,5-Tetrachlorobenzene	ND	1560	630	40		1580	770	49	20	40-117	50
Acetophenone	ND	1560	680	44		1580	840	53	21	14-144	50
2,4,6-Trichlorophenol	ND	1560	620	40		1580	790	50	24	30-130	50
p-Chloro-m-cresol	ND	1560	700	45		1580	870	55	22	26-103	50
2-Chlorophenol	ND	1560	640	41		1580	800	51	22	25-102	50
2,4-Dichlorophenol	ND	1560	650	42		1580	820	52	23	30-130	50
2,4-Dimethylphenol	ND	1560	740	47		1580	940	59	24	30-130	50
2-Nitrophenol	ND	1560	750	48		1580	940	59	22	30-130	50
4-Nitrophenol	ND	1560	780	50		1580	980	62	23	11-114	50
2,4-Dinitrophenol	ND	1560	670J	43		1580	830J	52	21	4-130	50
4,6-Dinitro-o-cresol	ND	1560	790	51		1580	980	62	21	10-130	50
Pentachlorophenol	ND	1560	530	34		1580	680	43	25	17-109	50
Phenol	ND	1560	720	46		1580	910	57	23	26-90	50
2-Methylphenol	ND	1560	680	44		1580	850	54	22	30-130.	50
3-Methylphenol/4-Methylphenol	ND	1560	720	46		1580	910	57	23	30-130	50
2,4,5-Trichlorophenol	ND	1560	680	44		1580	830	52	20	30-130	50

Matrix Spike Sample Summary
Form 3
Semivolatiles

3/4

p. 4 of 4

Client	: Terraphase Engineering Inc.	**Lab Number**	: L2506139
Project Name	: ELMWOOD PRESERVE	**Project Number**	: CV04.001
Client Sample ID	: TEI-SB-02-6-8	**Matrix (Level)**	: SOIL (LOW)
Lab Sample ID	: L2506139-34	**Analysis Date**	: 02/08/25 05:57
Matrix Spike	: WG2027861-4	**MS Analysis Date**	: 02/08/25 03:07
Matrix Spike Dup	: WG2027861-5	**MSD Analysis Date**	: 02/08/25 05:33

		Matrix Spike Sample				Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
Benzoic Acid	ND	1560	310J	20		1580	440J	28	35	10-110	50
Benzyl Alcohol	ND	1560	730	47		1580	930	59	24	40-140	50
Carbazole WW	ND	1560	580	37	Q	1580	710	45	Q 20	54-128	50
1,4-Dioxane	ND	1560	620	40		1580	750	47	19	40-140	50

JMJ/A

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 5.0 std)	Recalculated RRF (RRF 5.0 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL MS5	11/19/2024	Phenol (DCB)	1.340	1.340	1.411	1.412	8.11	8.10
			Naphthalene (NPT)	0.956	0.956	1.035	1.035	14.05	14.03
			Diethylphthalate (ANT)	1.320	1.320	1.413	1.413	11.27	11.29
			Fluoranthene (PHN)	1.256	1.256	1.334	1.334	14.21	14.20
			Chrysene (CRY)	1.127	1.127	1.227	1.227	16.28	16.27
			Benzo(g,h,i)perylene (PRY)	1.066	1.066	1.115	1.116	10.86	10.87
2	ICAL BUFFY	11/10/2024	Phenol (DCB)	1.528	1.528	1.661	1.661	8.86	8.87
			Naphthalene (NPT)	0.991	0.990	1.064	1.065	11.90	11.90
			Diethylphthalate (ANT)	1.392	1.392	1.527	1.527	11.71	11.72
			Phenanthrene (PHN)	1.049	1.048	1.162	1.162	15.20	15.18
			Chrysene (CRY)	1.165	1.165	1.266	1.266	12.09	12.10
			Benzo(g,h,i)perylene (PRY)	1.035	1.035	1.100	1.100	9.93	9.92

LDC#: 60984B

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0207.D MS5	02/07/25 23:21	Phenol (DCB)	1.411	1.339	1.339	5.1	5.1
			Naphthalene (NPT)	1.035	0.909	0.909	12.2	12.2
			Diethylphthalate (ANT)	1.413	1.359	1.359	3.8	3.8
			Fluoranthene (PHN)	1.334	1.209	1.209	9.4	9.4
			Chrysene (CRY)	1.227	1.049	1.049	5.7	14.5
			Benzo(g,h,i)perylene (PRY)	1.115	1.079	1.079	3.2	3.2
2	ABN0207.D BUFFY	02/08/25 0:09	Phenol (DCB)	1.661	1.772	1.772	6.7	6.7
			Naphthalene (NPT)	1.064	1.017	1.017	4.5	4.4
			Diethylphthalate (ANT)	1.527	1.391	1.391	8.9	8.9
			Phenanthrene (PHN)	1.162	1.060	1.060	8.8	8.8
			Chrysene (CRY)	1.266	1.183	1.183	6.6	6.6
			Benzo(g,h,i)perylene (PRY)	1.100	1.185	1.185	7.7	7.8

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	16.574	66	66	0
2-Fluorobiphenyl	25.000	14.193	57	57	0
Terphenyl-d14	25.000	12.445	50	50	0
Phenol-d5	50.000	30.529	61	61	0
2-Fluorophenol	50.000	32.781	66	66	0
2,4,6-Tribromophenol	50.000	25.566	51	51	0

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration
MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

MS/MSD ID:___3/4____

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1564	1584	0	724	913	46	46	57	58	23	23
N-Nitroso-di-n-propylamine	1564	1584	0	627	770	40	40	49	49	20	20
4-Chloro-3-methylphenol	1564	1584	0	697	867	45	45	55	55	22	22
Acenaphthene	1564	1584	0	541	672	35	35	42	42	21	22
Pentachlorophenol	1564	1584	0	533	686	34	34	43	43	25	25
Pyrene	1564	1584	0	565	705	36	36	44	45	22	22

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2027861-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	23.032	27.611	58	58	69	69	17	18
N-Nitroso-di-n-propylamine	40.0	40.0	22.856	27.750	57	57	69	69	19	19
4-Chloro-3-methylphenol	40.0	40.0	25.759	31.582	64	64	79	79	21	20
Acenaphthene	40.0	40.0	24.610	29.378	62	62	73	73	16	18
Pentachlorophenol	40.0	40.0	24.722	31.135	62	62	78	78	23	23
Pyrene	40.0	40.0	25.810	30.764	64	65	77	77	18	18

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
2	Chrysene	275051	1239040	40.0	1.266	1.00	1000.0	30.15	0.9	258.5	260.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139 Services
Laboratory: ~~Alpha~~ Pace Analytical, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JMG
2nd Reviewer: CW

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r2 ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB= FB-250204 (Same SDG)
VII	Surrogate Spikes	SW/A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	ND	D = 1/DUP-01 (Same SDG)
XI	Target Analyte Quantitation	SW	Results <RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8 —	L2506139-34		Soil	02/04/2025	Category B
2	TS-10R-0-1 +	L2506139-46		Soil	02/04/2025	Category B
3	TS-03R-0-1 +	L2506139-56		Soil	02/04/2025	Category B
4	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
5	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

1. WG 2027741 - 1 Blk	(1)	
~~2. WG 2024260 -~~	~~(2)~~	
2. WG 2027183 -	(3)	
3. WG 2027210 -	(2)	

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?		√		
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: JVG

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)
Surrogates were added to all samples as required by the method.
All surrogate recoveries (%R) were within QC limits with the exceptions identified below.

#	Sample ID	Detector/ Column	Surrogate Compound	%R	(Limits)	Qualifications
	2 (ND+DET)	Col 1	B	29	30-150	J/UJ/P

Surrogate Compound

A Tetrachloro-m- xylene
B Decachlorobiphenyl (DCB)

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2	4,4'-DDE	45.0	J det/A
		trans-Chlordane	200	

Note: trans-Chlordane results in one col too high

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	1/6/2025	4,4'-DDE (CLP1)	1.415	1.415	1.327	1.327	11.68	11.68
			Dieldrin (CLP1)	1.338	1.338	1.316	1.316	6.43	6.43
			4,4'-DDE (CLP2)	1.137	1.138	1.178	1.178	5.44	5.46
			Dieldrin (CLP2)	1.102	1.102	1.162	1.162	4.35	4.35
2	ICAL PEST20	1/3/2025	Dieldrin (CLP1)	1.164	1.164	1.238	1.239	7.32	7.31
			4,4'-DDT (CLP1)	1.044	1.044	1.094	1.094	5.72	5.72
			Dieldrin (CLP2)	1.122	1.122	1.141	1.141	2.38	2.39
			4,4'-DDT (CLP2)	1.019	1.018	1.032	1.032	2.63	2.63

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG2027739-1 PEST11	02/07/25 5:38	4,4'-DDE (CLP1)	1.327	1.430	1.430	7.8	7.8
			Dieldrin (CLP1)	1.316	1.460	1.460	10.9	10.9
			4,4'-DDE (CLP2)	1.178	1.188	1.188	0.8	0.8
			Dieldrin (CLP2)	1.162	1.235	1.235	6.3	6.3
2	WG2028504-1 PEST11	02/10/25 9:48	4,4'-DDE (CLP1)	1.327	1.366	1.366	2.9	2.9
			Dieldrin (CLP1)	1.316	1.420	1.420	7.9	7.9
			4,4'-DDE (CLP2)	1.178	1.216	1.216	3.2	3.2
			Dieldrin (CLP2)	1.162	1.273	1.273	9.6	9.6
3	WG2027649-1 PEST20	02/06/25 19:51	Dieldrin (CLP1)	1.238	1.179	1.179	4.8	4.8
			4,4'-DDT (CLP1)	1.094	0.887	0.887	18.9	18.9
			Dieldrin (CLP2)	1.141	1.141	1.141	0.0	0.0
			4,4'-DDT (CLP2)	1.032	0.926	0.926	10.3	10.3

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	34.23	68	68	0
Tetrachloro-m- xylene	CLP2	50.0	44.62	89	89	0
Decachlorobiphenyl	CLP1	50.0	21.40	43	43	0
Decachlorobiphenyl	CLP2	50.0	45.70	91	91	0

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 4/5

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	38.4	39.1	0	31.8	32.6	83	83	83	83	2	2
DDT	38.4	39.1	0	40.2	41.4	105	105	106	106	3	3

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2027183-2,3 LCS/D_

Compound	SA (ug/Kg)		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	32.0	31.5	27.6	28.0	86	86	89	89	3	1
DDT	32.0	31.5	31.6	32.8	99	99	104	104	5	4

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
2	DDE	743900000	521600000	25.000	1.3270	10.00	15.14	1.00	0.900	19.7	19.7	0
	CLP1											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139 &rvicc&
Laboratory: ~~Alpha~~ Pace Analytical~~, Inc.~~, Westborough, MA

Method: PCBs (EPA 8082A)

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB= FB-250204 (same SDG)
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	ND	D = 1/DUP-01 (same SDG)
X	Target Analyte Quantitation	A	no results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8	L2506139-34		Soil	02/04/2025	Category B
2	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

WG2027444 - 1 blk		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/4/2025	1260-1 (CLP1)	0.050	0.050	0.051	0.051	6.69	6.53
			1260-1 (CLP2)	0.052	0.052	0.054	0.054	10.15	10.46

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG2028112-1	02/08/25	1260-1 (CLP1)	0.051	0.052	0.052	2.0	2.0
			1260-1 (CLP2)	0.054	0.049	0.049	9.3	9.3

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG__

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	461.122	92	92	0
Tetrachloro-m- xylene	RTX-CLP2	500	472.816	95	95	0
Decachlorobiphenyl	RTX-CLP1	500	440.519	88	88	0
Decachlorobiphenyl	RTX-CLP2	500	402.959	81	81	0

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	366	345	0	360	350	98	98	101	101	3	3

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: __WG2027444/-2,3 LCS/D__

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	303	290	268	239	88	88	82	82	7	11

Lab RPD based on %R

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
LCS	1260	4.046E+08	7.355E+08	250	0.051	5.00	10.32	1.00	NA	**2673.0**	2677.6	0
	CLP1											
											Reported	
	1260-Total =	(2673+2652.208+2904.448+2978.296+2598.203)						conc =	(2761.23)(5mL)		**final conc**	
			5						(10.32g)(5mL)			
	=	2761.23						=	**267.6**		**268.0**	
	clean-up vol = 5 mL											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139 Services
Laboratory: ~~Alpha~~ Pace Analytical, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: DG
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-250204 (Same SDG)
VI	Surrogate Spikes / IS	A / A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	SW	LCS/D
IX	Field Duplicate	ND	D = 1 / DUP-01 (Same SDG)
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8	L2506139-34		Soil	02/04/2025	Category B
2	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

WG2027154 - 1 blk		

Method: GC Herbicides (EPA SW 846 Method 8151A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			√	
Were the RT windows properly established?	√			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
V. Field Blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG2027154-2, 3 LCS/D	2,4-D				33	30	All (ND)	J det/P

LDC #: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.47 std)	Recalculated CF (0.47 std)	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL Pest17	01/10/25	2,4-D (Col 1)	0.220	0.220	0.231	0.232	10.33	10.28
			2,4-D (Col 2)	0.222	0.222	0.234	0.234	9.16	9.16

LDC #: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where:
N = Initial Calibration Factor or Nominal Amount
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

#	Standard ID	Calibration Date	Compound	CF	Reported CF (CCV)	Recalculated CF (CCV)	Reported % D	Recalculated %D
1	wg2027815-1	2/7/2025	2,4-D (Col 1)	0.231	0.224	0.224	3.0	3.0
			2,4-D (Col 2)	0.234	0.234	0.234	0.0	0.0

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: _1____

	Surrogate Spiked	Surrogate	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
BB (1C)	0.500	0.337	67	67	0
BB (2C)	0.500	0.332	66	66	0

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DCAA)	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic acid	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: __2/3___

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	195	197	0	154	167	79	79	85	85	8	8

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG2027154-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	162.0	163.0	147.0	105.0	91	91	65	64	33	33

LDC#: 60984B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

Method: GC Herbicides (EPA SW 846 Method 8151A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (uL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
LCS	2,4-D	289300000	690500000	0.250	0.231	10000	30.84	1.00	NA	147.0	147.0	0
	CLP1											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139 Servicca
Laboratory: ~~Alpha~~ Pace Analytical, ~~Inc.,~~ Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: QV6
2nd Reviewer:

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	LC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A / A	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration/ISC/Bile Salt	A	CCV ≤ 30% ISC ≤ 30%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-25 0204 (same SDG)
VII	Matrix spike/Matrix spike duplicates	A	
VIII	Laboratory Control Sample	A	LCS, LL LCS
IX	Field Duplicate	SW	D = 1/DUP-01
X	Internal standards	A	EIS NIS
XI	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8	L2506139-34		Soil	02/04/2025	Category B
2	TS-03R-0-1	L2506139-56		Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
4	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

WG2028604 - Blk		

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	√			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			√	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	√			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were the retention time windows properly established?	√			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) of the initial calibration verification < 30%?	√			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	√			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	√			
Were all the retention times within the acceptance windows?	√			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	√			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) within limits?	√			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	√			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	√			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?			√	
Did reported results include both branched and linear isomers?	√			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	√			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	√			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	√			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	√			
Were ion ratios between 50-150%?	√			
Were manual integrations reviewed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: LC/MS PFAS (EPA Method 1633)

Compound	Concentration (ug/Kg)		RPD
	1	DUP-01	
PFOS	0.070	0.067	4

LDC #: 60984B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound
S= Standard deviation of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF 2.5/2.32	Recalculated RRF 2.5/2.32	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL LCMS07	2/6/2025	PFOA (M8-PFOA)	0.816	0.816	0.791	0.791	6.29	6.28
			PFOS (M8-PFOS)	1.025	1.025	1.012	1.012	7.24	7.24

LDC #: 60984B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Conc	Reported Conc (CCV)	Recalculated Conc (CCV)	Reported %R	Recalculated %R
1	SCI07_250212_72	2/12/2025	PFOA (M8-PFOA)	5.000	5.006	5.008	100.1	100.2
			PFOS (M8-PFOS)	4.640	4.770	4.771	102.8	102.8
2	SCI07_250212_91	2/12/2025	PFOA (M8-PFOA)	5.000	4.986	4.988	99.7	99.8
			PFOS (M8-PFOS)	4.640	4.491	4.491	96.8	96.8

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration, SA = Spike added, SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery, MSD = Matrix spike duplicate recovery

MS/MSD ID:___3/4_____

Compound	SA (ng/g)		SC (ng/g)	SSC (ng/g)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	1.99	2.00	0.0	2.11	1.88	106	106	94	94	12	12
PFOS	1.85	1.85	0.070	2.06	2.02	108	108	105	105	2	2

P:\L4 recalc\pfas\60984B s terraphase elmwood alpha

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2028604-3 LCS

Compound	SA (ng/g)		SSC (ng/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
					Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2.00	NA	2.27	NA	113	114				
PFOS	1.86		1.85		100	99.5				

LDC # 60984B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vf = Final volume extract
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Cis (ng/mL)	RRF	DF	Vf (mL)	Vo (g)	% S/100	Calculated Concentration (ng/g)	Reported Concentration (ng/g)	% Diff
2	PFOA	324150	843612	2.500	0.791	1.000	4.0	6.15	0.811	0.974	0.974	0

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2506139
Reviewer:	Skylar Gerace and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
TEI-SB-02-6-8	L2506139-34	Metals, Wet Chemistry
TS-03R-0-1	L2506139-56	Metals
TEI-SB-02-6-8MS	L2506139-34MS	Metals, Wet Chemistry
TEI-SB-02-6-8MSD	L2506139-34MSD	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks:	FB-250204
Field Duplicate pair:	TEI-SB-02-6-8 and DUP-01

The above-listed soil samples were collected on February 4, 2025 and were analyzed for metals by SW-846 methods 6010D and 7471B and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Aluminum Iron Magnesium	1.44 mg/Kg 3.35 mg/Kg 0.842 mg/Kg	7.2 mg/Kg 16.75 mg/Kg 4.21 mg/Kg	TEI-SB-02-6-8
PB (prep blank)	Iron	0.538 mg/Kg	2.69 mg/Kg	TS-03R-0-1

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB-250204 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-250204	Calcium	0.0464 mg/L	0.232 mg/Kg	TEI-SB-02-6-8 TS-03R-0-1

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250204 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TEI-SB-02-6-8MS/MSD (TEI-SB-02-6-8)	Antimony	54 (75-125)	51 (75-125)	UJ (all non-detects)

For TEI-SB-02-6-8MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

LCS Results

All criteria were met.

Field Duplicate Results

Samples TEI-SB-02-6-8 and DUP-01 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Metals

Analyte	Concentration (ug/Kg)		RPD
	TEI-SB-02-6-8	DUP-01	
Aluminum	8420	8090	4
Arsenic	3.39	2.28	39
Barium	74.2	77.5	4
Beryllium	0.477	0.428	11
Calcium	2340	1600	38
Chromium	15.3	16.0	4
Cobalt	8.69	7.75	11
Copper	22.5	19.4	15
Iron	13400	11700	14
Lead	6.18	5.39	14
Magnesium	3900	3640	7
Manganese	84.3	77.7	8
Nickel	16.5	15.8	4
Potassium	1010	983	3
Vanadium	26.2	20.5	24
Zinc	49.2	48.9	1

Wet Chemistry

Analyte	Concentration (ug/Kg)		RPD
	TEI-SB-02-6-8	DUP-01	
Hexavalent chromium	0.574	0.514	11

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
TEI-SB-02-6-8 TS-03R-0-1	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB-250204
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	SW ~~N~~	D = 1+DUP-01
XII	Target Analyte Quantitation	A	MDL < samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8 2x, all but Hg, matrix	L2506139-34		Soil	02/04/2025	Category B
2	TS-03R-0-1 2x, all but Hg, matrix	L2506139-56		Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
4	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
Were all water samples preserved to a pH of <2.			x	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			x	
Were %RSDs of isoptoes in the tuning solution ≤5%?			x	
III./IV. Calibration				
Were all instruments calibrated daily?	x			
Were the proper standards used?	x			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	x			
Were the low level standard checks within 70-130%?			x	
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
V. Interference Check Sample				
Were the interference check samples performed daily?	x			
Were the AB solution recoveries within 80-120%?	x			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?	x			
Was there contamination in the initial and continuing calibration blanks?		x		
VII. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?	x			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		x		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	x			
X. Serial Dilution				
Were all percent differences <10%?	x			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		x		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?	x		x	
Were target analytes detected in the field duplicates?	x		x	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			x	
If the recoveries were outside the limits, was a reanalysis performed?			x	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	s	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
1-2	s	7471B	Hg

Comments:

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**					
Al	1.44		7.2					
Fe	3.35		16.75					
Mg	0.842		4.21					

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 2

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**					
Fe	0.538		2.69					

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 02/04/25 09:25
Associated Samples: 1-2

			Sample Identification					
Analyte	Blank ID	Action Level						
	FB-250204							
Ca	0.0464	0.232						

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4		Sb	54	51	75-125			1	J/UJ/A	ND

Comment:
3-4 (multiple analytes):
>4x, %R

Method: Metals

Analyte	Concentration (mg/kg)		RPD
	1	DUP-01	
Aluminum	8420	8090	4
Arsenic	3.39	2.28	39
Barium	74.2	77.5	4
Beryllium	0.477	0.428	11
Calcium	2340	1600	38
Chromium	15.3	16.0	4
Cobalt	8.69	7.75	11
Copper	22.5	19.4	15
Iron	13400	11700	14
Lead	6.18	5.39	14
Magnesium	3900	3640	7
Manganese	84.3	77.7	8
Nickel	16.5	15.8	4
Potassium	1010	983	3
Vanadium	26.2	20.5	24
Zinc	49.2	48.9	1

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis
True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Al	0.48	0.5	96	96	Y
CCV	ICP	Sb	0.507	0.5	101.4	101	Y
ICSAB	ICP	Al	522	500	104.4	104	Y
ICV	CVAA	Hg	0.0027	0.003	90	90	Y
CCV	CVAA	Hg	0.0099	0.01	99	99	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG2028567-2	LCS	Ba	166	160	103.75	104	Y
1 MS	MS	Pb	49.51	49.6	99.81854839	100	Y
1 MSD	Duplicate	Pb	55.2	54.6	1.098901099	1	Y
1 PDS	PDS	Sb	40.6	47	86.38297872	86	Y
1 SD	Serial dilution	Fe	12400	11700	5.982905983	6	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Cr	0.1704	2	1.273	50	84	16	15.93536079	Y
2	Hg	0.001367	1	0.385	50	81	0.219	0.219175886	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984B
SDG #: L2506139
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-250204
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	SW	D=1 (DUP01)
X	Target Analyte Quantitation	A	No dilutions, MDL< samples <RL
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TEI-SB-02-6-8	L2506139-34		Soil	02/04/2025	Category B
2	TEI-SB-02-6-8MS	L2506139-34MS	MS	Soil	02/04/2025	Category B
3	TEI-SB-02-6-8MSD	L2506139-34MSD	MSD	Soil	02/04/2025	Category B

Notes:

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	x			
Were the proper number of standards used?	x			
Were all initial and continuing calibration verifications within the QC limits?	x			
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
Were balance checks performed as required?	x			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
V. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?		x		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	x			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	x			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?	x		x	
Were target analytes detected in the field duplicates?	x		x	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Cr(VI)
QC	
2-3	Cr(VI)

METHOD: Inorganics

Analyte	Concentration (mg/kg)		RPD
	1	DUP-01	
Cr(VI)	0.574	0.514	11

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/kg)	True (mg/kg)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.21	0.2		105	106	Y
Calibration verification	Cr(VI)	0.21	0.2		105	106	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG2027249-2	LCS	Cr(VI)	194	192	101.0416667	101	Y
2	MS	Cr(VI)	1019.426	1020	99.94372549	100	Y
3	Duplicate	Cr(VI)	100	97	3.045685279	3*	Y
1 PDS	PDS	Cr(VI)	200.426	194	103.3123711	103	Y

Comment: ~~*MS/MSD spike not comparable (text)~~

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.012	1	2.4596	100	84	0.574	0.580814534	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2506464
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
TS-11R-0-1.5	L2506464-01	VOC, SVOC, Pesticide, PCB
TS-13R-0-1	L2506464-27	VOC, SVOC, Pesticide
TS-11R-0-1.5MS	L2506464-01MS	VOC, Pesticide, PCB
TS-11R-0-1.5MSD	L2506464-01MSD	VOC, Pesticide, PCB
TS-13R-0-1MS	L2506464-27MS	SVOC
TS-13R-0-1MSD	L2506464-27MSD	SVOC
TS-11R-0-1.5DL	L2506464-01DL	SVOC

Associated QC Samples(s):

Field/Trip Blanks: TB-250205, FB-250205
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 5, 2025 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers with the exception listed below.

The SVOC nondetect results for benzoic acid in sample TS-13R-0-1 were rejected (R) due to severely low MS/MSD percent recoveries. The results are not usable for project objectives, which may have a major impact on the data usability.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
01/13/25	ICAL VOA127	1,4-Dioxane	0.002 (≥0.005)	TS-11R-0-1.5 TS-13R-0-1	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/11/25	V27250211A01.D	Chloromethane	25.3	TS-11R-0-1.5	J (all detects)
		Acetone	29.1	TS-13R-0-1	UJ (all non-detects)
		1,2-Dichloropropane	21.6		
		2-Chlorotoluene	29.8		
		trans-1,4-Dichloro-2-butene	21.1		

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
02/11/25	V27250211A01.D	1,4-Dioxane	0.00224 (≥0.005)	TS-11R-0-1.5 TS-13R-0-1	J (all detects) UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/12/25	ABN0212.D	Bis(2-chloroisopropyl)ether	35.6	TS-11R-0-1.5	UJ (all non-detects)
02/11/25	ABN0211.D	Benzoic acid	22.2	TS-13R-0-1	J (all detects)
		Hexachlorobutadiene	23.4		UJ (all non-detects)
		Hexachlorocyclopentadiene	50.5		
		3-Nitroaniline	26.9		
		4-Nitroaniline	22.6		
		Pentachlorophenol	24.9		
		Di-n-butylphthalate	20.5		
		Butyl benzyl phthalate	32.5		
		Bis(2-Ethylhexyl)phthalate	32.6		
		Di-n-octylphthalate	37.6		
02/11/25	ADP0211.D	1,4-Dioxane	24.6	TS-13R-0-1	J (all detects) UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
02/11/25	wg2028848-4	CLP1	beta-BHC	25.7	TS-11R-0-1.5 TS-13R-0-1	UJ (all non-detects)

PCB

All criteria were met.

Blanks

SVOC

Contamination was detected in the associated SVOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG2028296-1BLANK	Di-n-butylphthalate	54 ug/Kg	RL	TS-13R-0-1

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
TS-13R-0-1	Di-n-butylphthalate	54 ug/Kg	180U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

Contamination was detected in the field blank sample FB-250205 for SVOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-250205	Di-n-butylphthalate	2.9 ug/L	RL	TS-11R-0-1.5 TS-13R-0-1 TS-11R-0-1.5DL

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

Qualified sample results are listed in the table below.

Sample ID	Analyte	Level Detected	Validation Action
TS-13R-0-1	Di-n-butylphthalate	54 ug/Kg	180U ug/Kg

These results can be used for project objectives as nondetects (U) which may have a minor impact on the data usability.

VOC

Contamination was not detected in the method blanks.

No positive results were found in the trip blank sample TB-250205 and field blank sample FB-250205 for VOC analysis.

Pesticide, PCB

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250205 for pesticide and PCB analyses.

Surrogate Recoveries

SVOC

Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for sample TS-13R-0-1. Using professional judgment, no data were qualified when one base or one acid surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VOC, Pesticide, PCB

All criteria were met.

MS/MSD Results

VOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TS-11R-0-1.5MS/MSD (TS-11R-0-1.5)	Chlorobenzene	64 (70-130)	-	J (all detects) UJ (all non-detects)
	trans-1,3-Dichloropropene	52 (70-130)	-	
	cis-1,3-Dichloropropene	67 (70-130)	-	
	trans-1,2-Dichloroethene	67 (70-130)	-	
	1,2-Dichlorobenzene	54 (70-130)	-	
	1,3-Dichlorobenzene	44 (70-130)	67 (70-130)	
	1,4-Dichlorobenzene	37 (70-130)	62 (70-130)	
	Styrene	56 (70-130)	-	
	Vinyl acetate	31 (70-130)	39 (70-130)	
	1,2-Dibromoethane	63 (70-130)	-	
	Bromobenzene	55 (70-130)	-	
	n-Butylbenzene	38 (70-130)	-	
	4-Chlorotoluene	51 (70-130)	-	
	Hexachlorobutadiene	48 (67-130)	-	
	p-Isopropyltoluene	64 (70-130)	-	
	Naphthalene	46 (70-130)	67 (70-130)	
	n-Propylbenzene	64 (70-130)	-	
	1,2,3-Trichlorobenzene	29 (70-130)	54 (70-130)	
	1,2,4-Trichlorobenzene	20 (70-130)	44 (70-130)	
	p-Diethylbenzene	41 (70-130)	-	
	4-Ethyltoluene	61 (70-130)	-	
	1,2,4,5-Tetramethylbenzene	56 (70-130)	-	
	trans-1,4-Dichloro-2-butene	51 (70-130)	-	
TS-11R-0-1.5MS/MSD (TS-11R-0-1.5)	Chloromethane	-	133 (52-130)	None

No data were qualified due to high %R when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤30)	Validation Action
TS-11R-0-1.5MS/MSD (TS-11R-0-1.5)	trans-1,3-Dichloropropene	31	None
	1,3-Dichlorobenzene	34	
	1,4-Dichlorobenzene	39	
	n-Butylbenzene	54	
	1,2,3-Trichlorobenzene	48	
	1,2,4-Trichlorobenzene	64	
	p-Diethylbenzene	46	
	trans-1,4-Dichloro-2-butene	33	

No data were qualified due to high RPDs when the associated results were non-detected.

SVOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TS-13R-0-1MS/MSD (TS-13R-0-1)	Hexachlorocyclopentadiene	-	36 (40-140)	UJ (all non-detects)
	2,4-Dinitrophenol	-	0 (4-130)	
TS-13R-0-1MS/MSD (TS-13R-0-1)	1,2,4,5-Tetrachlorobenzene	120 (40-117)	-	None
	Pentachlorophenol	120 (17-109)	120 (17-109)	
TS-13R-0-1MS/MSD (TS-13R-0-1)	Benzoic acid	0 (10-110)	0 (10-110)	R (all non-detects)

No data were qualified due to high %R when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤50)	Validation Action
TS-13R-0-1MS/MSD (TS-13R-0-1)	2,4-Dinitrophenol	200	None
	4,6-Dinitro-o-cresol	79	

No data were qualified due to high RPDs when the associated results were non-detected.

Pesticide, PCB

All criteria were met.

LCS Results

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG2028296-2,3 LCS/LCSD (TS-13R-0-1)	2,4-Dinitrophenol 4,6-Dinitro-o-cresol Pentachlorophenol	134 (4-130) 135 (10-130) 117 (17-109)	- - -	None
WG2029375-2,3 LCS/LCSD (TS-11R-0-1.5)	4-Nitrophenol	116 (11-114)	-	None
WG2029375-2,3 LCS/LCSD (TS-11R-0-1.5)	Phenol	91 (26-90)	-	J (all detects)

No data were qualified due to high %R when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

VOC, Pesticide, PCB

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the VOC, SVOC, pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the PCB analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	SVOC Analysis Reported
TS-11R-0-1.5DL	10-fold dilution due to nature of sample matrix

Dilutions were not required for VOC, pesticide, and PCB analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
TS-13R-0-1	trans-Chlordane	79	J (all detects)

SVOC

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Finding	Criteria	Validation Action
TS-11R-0-1.5	Fluoranthene Bis(2-ethylhexyl)phthalate Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Chrysene Phenanthrene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	Not reportable

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984C
SDG #: L2506464
Laboratory: ~~Alpha~~ Pace Analytical Services, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JV6
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW / A	RSD ≤ 20% or ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250205 (same SDG) ↓ ↓ TB = TB-
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results < RL > MDL = J det.
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-11R-0-0.5	L2506464-01		Soil	02/05/2025	Category B
2	TS-13R-0-1	L2506464-27		Soil	02/05/2025	Category B
3	TS-11R-0-0.5MS	L2506464-01MS	MS	Soil	02/05/2025	Category B
4	TS-11R-0-0.5MSD	L2506464-01MSD	MSD	Soil	02/05/2025	Category B

Notes:

WG2029007-5 MBLK		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) < 30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2. Methyl isobutyl ketone
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2. 3-Chloro-1-propene
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	1/13/2025	ICAL VOA127	1,4-Dioxane		0.002 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	2/11/2025	V27250211A01.D	Chloromethane	25.3		All (ND+DET)	J/UJ/A
			Acetone	29.1			
			1,2-Dichloropropane	21.6			
			2-Chlorotoluene	29.8			
			trans-1,4-Dichloro-2-butene	21.1			
			1,4-Dioxane		0.00224 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	see attached						1 (%R)	J/UJ/A, J det/A
							(RPD)	J det/A
							(all ND except MMM, A2)	

3/4

p. 1 of 4

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Terraphase Engineering Inc.	Lab Number	: L2506464
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TS-11R-0-1.5	Matrix (Level)	: SOLID (LOW)
Lab Sample ID	: L2506464-01	Analysis Date	: 02/11/25 13:12
Matrix Spike	: WG2029007-6	MS Analysis Date	: 02/11/25 17:02
Matrix Spike Dup	: WG2029007-7	MSD Analysis Date	: 02/11/25 17:23

		Matrix Spike Sample		MS	Matrix Spike Duplicate		MSD			
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
										2R RPC
Methylene chloride	ND	206	160	75	184	160	87	3	70-130	30
1,1-Dichloroethane	ND	206	220	106	184	220	118	0	70-130	30
Chloroform	24	206	230	98	184	220	106	3	70-130	30
Carbon tetrachloride	ND	206	240	116	184	230	126	3	70-130	30
1,2-Dichloropropane	ND	206	230	114	184	230	126	0	70-130	30
Dibromochloromethane	ND	206	190	90	184	190	105	5	70-130	30
1,1,2-Trichloroethane	ND	206	200	95	184	190	102	4	70-130	30
Tetrachloroethene	ND	206	150	75	184	180	97	15	70-130	30
Chlorobenzene DD	ND	206	130	64 Q	184	160	88	22	70-130	30 J/WJ/A
Trichlorofluoromethane	ND	206	210	100	184	200	108	3	70-139	30
1,2-Dichloroethane	ND	206	190	92	184	210	112	9	70-130	30
1,1,1-Trichloroethane	ND	206	240	117	184	230	124	6	70-130	30
Bromodichloromethane	ND	206	200	96	184	210	111	4	70-130	30
trans-1,3-Dichloropropene W	ND	206	110	52 Q	184	150	79	31 Q	70-130	30 J/WJ/A Jd
cis-1,3-Dichloropropene R	ND	206	140	67 Q	184	180	95	24	70-130	30
1,1-Dichloropropene	ND	206	170	81	184	200	110	20	70-130	30
Bromoform	ND	206	170	82	184	170	91	1	70-130	30
1,1,2,2-Tetrachloroethane	ND	206	200	95	184	180	98	8	70-130	30
Benzene	ND	206	200	99	184	210	116	5	70-130	30
Toluene	ND	206	170	82	184	190	103	11	70-130	30
Ethylbenzene	ND	206	150	72	184	180	97	18	70-130	30
Chloromethane A	ND	206	250	123	184	250	133 Q	4	52-130	30 Jdet/A

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Terraphase Engineering Inc.	Lab Number	: L2506464
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TS-11R-0-1.5	Matrix (Level)	: SOLID (LOW)
Lab Sample ID	: L2506464-01	Analysis Date	: 02/11/25 13:12
Matrix Spike	: WG2029007-6	MS Analysis Date	: 02/11/25 17:02
Matrix Spike Dup	: WG2029007-7	MSD Analysis Date	: 02/11/25 17:23

		Matrix Spike Sample		MS	Matrix Spike Duplicate		MSD			
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
										2R RPD
Bromomethane	ND	206	170	84	184	160	89	5	57-147	30
Vinyl chloride	ND	206	220	109	184	230	124	2	67-130	30
Chloroethane	ND	206	210	102	184	210	113	1	50-151	30
1,1-Dichloroethene	ND	206	170	83	184	190	100	8	65-135	30
trans-1,2-Dichloroethene PPP	ND	206	140	67 Q	184	170	91	19	70-130	30 J/MS/A
Trichloroethene	ND	206	170	84	184	200	110	15	70-130	30
1,2-Dichlorobenzene JJJ	ND	206	110	54 Q	184	140	75	22	70-130	30
1,3-Dichlorobenzene FFF	ND	206	90	44 Q	184	130	68 Q	34 Q	70-130	30 Jdet/
1,4-Dichlorobenzene HHH	ND	206	77	37 Q	184	110	62 Q	39 Q	70-130	30
Methyl tert butyl ether	ND	206	180	87	184	170	90	8	66-130	30
p/m-Xylene	ND	412	290	70	368	350	94	18	70-130	30
o-Xylene	ND	412	350	84	368	370	100	7	70-130	30
cis-1,2-Dichloroethene	ND	206	150	72	184	170	91	12	70-130	30
Dibromomethane	ND	206	140	70	184	170	91	15	70-130	30
Styrene FF	ND	412	230	56 Q	368	300	81	26	70-130	30 J/MS/A
Dichlorodifluoromethane	ND	206	170	84	184	170	91	2	30-146	30
Acetone	23J	206	160	78	184	150	80	8	54-140	30
Carbon disulfide	ND	206	150	72	184	170	94	16	59-130	30
2-Butanone	ND	206	210	102	184	200	108	6	70-130	30
Vinyl acetate HH	ND	206	64	31 Q	184	72	39 Q	12	70-130	30 J/MS/A
4-Methyl-2-pentanone	ND	206	220	105	184	200	108	8	70-130	30
1,2,3-Trichloropropane	ND	206	210	102	184	190	103	10	68-130	30

Matrix Spike Sample Summary
Form 3
Volatiles

3/4

P. 3 of 4

Client	: Terraphase Engineering Inc.	Lab Number	: L2506464
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TS-11R-0-1.5	Matrix (Level)	: SOLID (LOW)
Lab Sample ID	: L2506464-01	Analysis Date	: 02/11/25 13:12
Matrix Spike	: WG2029007-6	MS Analysis Date	: 02/11/25 17:02
Matrix Spike Dup	: WG2029007-7	MSD Analysis Date	: 02/11/25 17:23

		Matrix Spike Sample				Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	MS %R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	MSD %R	RPD	Recovery Limits	RPD Limit
											%R RPD
2-Hexanone	ND	206	160	80		184	160	89	0	70-130	30
Bromochloromethane	ND	206	170	83		184	190	100	8	70-130	30
2,2-Dichloropropane	ND	206	250	119		184	230	124	7	70-130	30
1,2-Dibromoethane TT	ND	206	130	63	Q	184	160	85	19	70-130	30 J/J/A
1,3-Dichloropropane	ND	206	170	82		184	190	100	8	69-130	30
1,1,1,2-Tetrachloroethane	ND	206	220	109		184	210	113	7	70-130	30
Bromobenzene WW	ND	206	110	55	Q	184	140	78	23	70-130	30
n-Butylbenzene III	ND	206	78	38	Q	184	140	74	54 Q	70-130	30 Jdet/J
sec-Butylbenzene	ND	206	150	71		184	180	97	20	70-130	30
tert-Butylbenzene	ND	206	190	94		184	190	102	3	70-130	30
o-Chlorotoluene	ND	206	170	80		184	170	91	2	70-130	30
p-Chlorotoluene BBB	ND	206	110	51	Q	184	140	77	29	70-130	30
1,2-Dibromo-3-chloropropane	ND	206	170	83		184	170	91	2	68-130	30
Hexachlorobutadiene LLL	ND	206	100	48	Q	184	130	72	28	67-130	30
Isopropylbenzene	ND	206	180	86		184	190	103	7	70-130	30
p-Isopropyltoluene GGG	ND	206	130	64	Q	184	170	90	23	70-130	30
Naphthalene MMM	14J (Det)	206	95	46	Q	184	120	67 Q	26	70-130	30
Acrylonitrile	ND	206	180	87		184	170	92	6	70-130	30
n-Propylbenzene YY	ND	206	130	64	Q	184	170	92	25	70-130	30
1,2,3-Trichlorobenzene NNN	ND	206	61	29	Q	184	99	54 Q	48 Q	70-130	30 Jdet/A
1,2,4-Trichlorobenzene KKK	ND	206	42	20	Q	184	81	44 Q	64 Q	70-130	30
1,3,5-Trimethylbenzene	3.2J	206	170	84		184	180	99	6	70-130	30

Matrix Spike Sample Summary
Form 3
Volatiles

Client	: Terraphase Engineering Inc.	Lab Number	: L2506464
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001
Client Sample ID	: TS-11R-0-1.5	Matrix (Level)	: SOLID (LOW)
Lab Sample ID	: L2506464-01	Analysis Date	: 02/11/25 13:12
Matrix Spike	: WG2029007-6	MS Analysis Date	: 02/11/25 17:02
Matrix Spike Dup	: WG2029007-7	MSD Analysis Date	: 02/11/25 17:23

		Matrix Spike Sample				Matrix Spike Duplicate					
Parameter	Sample Conc. (ug/kg)	Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R		Spike Added (ug/kg)	Spike Conc. (ug/kg)	%R	RPD	Recovery Limits	RPD Limit
1,2,4-Trimethylbenzene	2.2J	206	150	73		184	170	92	12	70-130	30
1,4-Dioxane	ND	10300	10000	99		9210	8800	95	15	65-136	30
p-Diethylbenzene	ND	206	85	41	Q	184	140	73	46	Q 70-130	30
p-Ethyltoluene	ND	206	130	61	Q	184	160	86	24	70-130	30
1,2,4,5-Tetramethylbenzene	0.93J (Det)	206	120	56	Q	184	140	78	21	70-130	30
Ethyl ether	ND	206	190	91		184	180	100	2	67-130	30
trans-1,4-Dichloro-2-butene	ND	206	110	51	Q	184	150	79	33	Q 70-130	30

LDC #: 60984C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 20 std)	Recalculated RRF (RRF 20 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA127	01/13/25	Benzene (FBZ)	0.816	0.816	0.884	0.884	7.77	7.77
			Ethylbenzene (CBZ)	1.331	1.331	1.468	1.469	5.43	5.42
			Naphthalene (DCB)	2.040	2.040	2.130	2.130	9.36	9.36

LDC #: 60984C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V05240110A01 7:37	02/11/25	Benzene	(FBZ)	0.884	1.006	1.006	13.8	13.8
			Ethylbenzene	(CBZ)	1.468	1.585	1.585	8.0	8.0
			Naphthalene	(DCB)	2.130	1.938	1.938	9.0	9.0

LDC# 60984C

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	21.19	106	106	0
1,2-Dichloroethane-d4	20.0	23.53	118	118	0
Toluene-d8	20.0	20.69	103	103	0
4-Bromofluorobenzene	20.0	20.61	103	103	0

LDC# 60984C

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: __3/4___

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	100.0	100.0	0	82.946	100.451	83	83	100	100	8	19
Benzene	100.0	100.0	0	99.223	115.944	99	99	116	116	5	16
Trichloroethene	100.0	100.0	0	84.164	109.888	84	84	110	110	15	27
Toluene	100.0	100.0	0	82.573	102.962	83	83	103	103	11	22
Chlorobenzene	100.0	100.0	0	63.763	88.724	64	64	88	89	22	33

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2028945-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	37.420	37.729	94	94	94	94	0	1
Benzene	40.00	40.00	45.505	44.735	114	114	112	112	2	2
Trichloroethene	40.00	40.00	45.965	45.641	115	115	114	114	1	1
Toluene	40.00	40.00	43.696	42.536	106	109	106	106	3	3
Chlorobenzene	40.00	40.00	43.560	41.820	109	109	104	105	5	4

VALIDATION FINDINGS WORKSHEET

Sample Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Naphthalene	28816	77159	20.0	2.130	1.0	5.00	1.40	0.9	13.92	14	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984C
SDG #: L2506464
Laboratory: ~~Alpha~~ Pace Analytical Services, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVC
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≥ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB-250205 (same SDG)
VII	Surrogate Spikes	SW	# 2 (NQ - only 1 out) (no MS)
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	SW	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-11R-0-~~0~~.5	L2506464-01		Soil	02/05/2025	Category B
2	TS-13R-0-1	L2506464-27		Soil	02/05/2025	Category B
3	TS-13R-0-1MS	L2506464-27MS	MS	Soil	02/05/2025	Category B
4	TS-13R-0-1MSD	L2506464-27MSD	MSD	Soil	02/05/2025	Category B
5.	1 DL 10X	-01 DL		↓	↓	↓

Notes:

-1.	WG2029375-1 BLK	(1)	
+2.	WG2028296-1 ↓	(2)	

VALIDATION FINDINGS CHECKLIST

Method: SVOC (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) < 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?	√			
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?	√			
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤ 20%)	RRF (Limits)	Associated samples	Qualifications
	2/12/2025	ABN0212.D	Bis(2-chloroisopropyl)ether	35.6		1, MB1 (ND)	J/UJ/A
	2/11/2025	ABN0211.D	Benzoic Acid	22.2		2 (ND+DET)	
			Hexachlorobutadiene	23.4			
			Hexachlorocyclopentadiene	50.5			
			3-Nitroaniline	26.9			
			4-Nitroaniline	22.6			
			Pentachlorophenol	24.9			
			Di-n-butylphthalate	20.5			
			Butyl benzyl phthalate	32.5			
			Bis(2-ethylhexyl)phthalate	32.6			
			Di-n-octylphthalate	37.6			
		ADP0211.D	1,4-Dioxane	24.6		✓	✓

	DOD	NFG	
%D	20%/50%	Method criteria	RRF: 0.05

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: _JVG_

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Method blanks were performed at the required frequency and sequence.

No contaminants were found in the method blanks with the exceptions identified below.

Blank extraction date:__02/09/25__ **Blank analysis date:** __02/10/25____ **Associated samples:**_____2._____

Conc. units: __ug/Kg_____

Compound	Blank ID	Sample Identification						
	WG2028296-1BLANK		2					
Di-n-butylphthalate	54		54/180U					

Blank extraction date:_____ **Blank analysis date:** _____ **Associated samples:**_____

Conc. units: _____

Compound	Blank ID	Sample Identification						

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: _JVG_

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Field blanks were identified in this SDG.

No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 2/5/2025 **Blank units:** ugL **Associated sample units:** ug/Kg

Field blank type: FB **Associated Samples:** ALL

(FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Compound	Blank ID	Blank ID	Sample Identification						
	FB-250205		2						
Di-n-butylphthalate	2.9		54/180U						

Sampling date: _____ **Blank units:** _____ **Associated sample units:** _____

Field blank type: **Associated Samples:**

Compound	Blank ID	Sample Identification							

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	Hexachlorocyclopentadiene	-	36	40-140			1 (ND)	J/UJ/A
	1,2,4,5-Tetrachlorobenzene	120	-	40-117				J det/A
	2,4-Dinitrophenol	-	0	4-130				J/UJ/A
	Pentachlorophenol	120	120	17-109				J det/A
	Benzoic Acid	0	0	10-110				J/R/A
	2,4-Dinitrophenol				200	50		J det/A
	4,6-Dinitro-o-cresol				79	50		

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG2028296-2,3 LCS/D	2,4-Dinitrophenol	134		4-130			2, MB2 (ND)	J det/P
	4,6-Dinitro-o-cresol	135		10-130				
	Pentachlorophenol	117		17-109				
WG2029375-2,3 LCS/D	4-Nitrophenol	116		11-114			1, MB1 (ND)	
	Phenol	91		26-90			(DET)	

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: _JVG_

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

All available information pertaining to the data were reviewed for data quality, uncertainty and bias using professional judment to compliment the overall assessment made below.

#	Sample ID	Analyte	Findings	Qualifications
	1	Fluoranthene	> cal range	NR
		Bis(2-ethylhexyl)phthalate		
		Benzo(a)anthracene		
		Benzo(a)pyrene		
		Benzo(b)fluoranthene		
		Chrysene		
		Phenanthrene		
		Pyrene		

Comments:_____

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL JULIET	8/24/2024	Phenol (DCB)	1.642	1.642	1.576	1.576	3.17	3.18
			Naphthalene (NPT)	1.035	1.035	1.024	1.024	4.53	4.53
			Diethylphthalate (ANT)	1.320	1.320	1.315	1.315	2.79	2.80
			Fluoranthene (PHN)	1.344	1.344	1.282	1.282	4.21	4.22
			Chrysene (CRY)	1.214	1.214	1.196	1.196	2.52	2.52
			Benzo(g,h,i)perylene (PRY)	1.075	1.075	1.058	1.058	5.98	6.00
2	ICAL BUFFY	11/10/2024	Phenol (DCB)	1.528	1.528	1.661	1.661	8.86	8.87
			Naphthalene (NPT)	0.991	0.990	1.064	1.065	11.90	11.90
			Diethylphthalate (ANT)	1.392	1.392	1.527	1.527	11.71	11.72
			Phenanthrene (PHN)	1.049	1.048	1.162	1.162	15.20	15.18
			Chrysene (CRY)	1.165	1.165	1.266	1.266	12.09	12.10
			Benzo(g,h,i)perylene (PRY)	1.035	1.035	1.100	1.100	9.93	9.92

LDC#: 60984C

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0212 BUFFY	02/12/25 7:28	Phenol (DCB)	1.661	1.643	1.643	1.1	1.1
			Naphthalene (NPT)	1.065	1.049	1.049	1.5	1.5
			Diethylphthalate (ANT)	1.527	1.413	1.413	7.5	7.5
			Phenanthrene (PHN)	1.162	1.050	1.050	9.6	9.6
			Chrysene (CRY)	1.266	1.172	1.172	7.4	7.4
			Benzo(g,h,i)perylene (PRY)	1.100	1.184	1.184	7.6	7.6
2	ABN0811 ABN0211	02/11/25 9:25	Phenol (DCB)	1.576	1.467	1.467	6.9	6.9
			Naphthalene (NPT)	1.024	0.987	0.987	3.6	3.6
			Diethylphthalate (ANT)	1.315	1.415	1.415	7.6	7.6
			Fluoranthene (PHN)	1.282	1.244	1.244	3.0	3.0
			Chrysene (CRY)	1.196	1.205	1.205	0.8	0.8
			Benzo(g,h,i)perylene (PRY)	1.058	1.177	1.177	11.2	11.2

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	17.091	68	68	0
2-Fluorobiphenyl	25.000	14.824	59	59	0
Terphenyl-d14	25.000	13.140	53	53	0
Phenol-d5	50.000	32.335	65	65	0
2-Fluorophenol	50.000	31.332	63	63	0
2,4,6-Tribromophenol	50.000	29.715	59	59	0

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration
MS = Matrix spike recovery
MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

MS/MSD ID:___3/4____

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	1450	1451	0	1101	1054	76	76	69	73	10	4
N-Nitroso-di-n-propylamine	1450	1451	0	1036	978	69	71	68	67	2	6
4-Chloro-3-methylphenol	1450	1451	0	1378	1255	97	95	83	86	15	9
Acenaphthene	1450	1451	22	1395	1295	97	95	90	88	7	7
Pentachlorophenol	1450	1451	0	1777	1733	120	123	120	119	6	3
Pyrene	1450	1451	230	1636	1498	94	97	88	87	6	9

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2029375-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	36.460	29.330	91	91	73	73	22	22
N-Nitroso-di-n-propylamine	40.0	40.0	35.003	28.528	88	88	71	71	21	20
4-Chloro-3-methylphenol	40.0	40.0	37.818	30.740	94	95	77	77	20	21
Acenaphthene	40.0	40.0	31.796	26.606	79	79	66	67	18	18
Pentachlorophenol	40.0	40.0	40.534	31.806	101	101	80	80	23	24
Pyrene	40.0	40.0	35.855	29.785	90	90	74	74	20	18

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Phenanthrene	2140149	1299490	40.0	1.162	10.00	1000.0	30.51	0.9014	20614.1	21000.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984C
SDG #: L2506464
Laboratory: ~~Alpha~~ Analytical Services, Inc., Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250205 (same SDG)
VII	Surrogate Spikes /TS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS 1
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results <RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-11R-0-0.5	L2506464-01		Soil	02/05/2025	Category B
2	TS-13R-0-1	L2506464-27		Soil	02/05/2025	Category B
3	TS-11R-0-0.5MS	L2506464-01MS	MS	Soil	02/05/2025	Category B
4	TS-11R-0-0.5MSD	L2506464-01MSD	MSD	Soil	02/05/2025	Category B

Notes:

WG 2078217-1 BOLC		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	2/11/2025	wg2028848-4	CLP1	beta-BHC	25.7	All (ND)	J/UJ/A

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2	trans-Chlordane	79	J det/A

Note: trans-Chlordane results in one col too high

LDC# 60984C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST10	12/12/2024	Dieldrin (CLP1)	1.584	1.584	1.705	1.705	14.39	14.40
			Dieldrin (CLP2)	1.611	1.611	1.593	1.593	3.60	3.60
			4,4'-DDD (CLP1)	1.098	1.098	1.191	1.191	13.76	13.76
			4,4'-DDD (CLP2)	1.255	1.255	1.240	1.240	3.59	3.59

LDC# 60984C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG2028848-4 PEST10	02/11/25	Dieldrin (CLP1)	1.705	1.774	1.774	4.0	4.0
			Dieldrin (CLP2)	1.593	1.721	1.721	8.0	8.0
			4,4'-DDD (CLP1)	1.191	1.350	1.350	13.4	13.4
			4,4'-DDD (CLP2)	1.240	1.393	1.393	12.3	12.3

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	26.34	53	53	0
Tetrachloro-m- xylene	CLP2	50.0	35.38	71	71	0
Decachlorobiphenyl	CLP1	50.0	36.70	73	73	0
Decachlorobiphenyl	CLP2	50.0	37.67	75	75	0

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	35.2	35.0	0	25.3	26.4	72	72	75	75	4	4
DDT	35.2	35.0	0	28.7	28.7	82	82	82	82	0	0

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG2028217-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	33.2	31.4	24.4	24.4	73	73	78	78	7	0
DDT	33.2	31.4	27.5	28.2	83	83	90	90	8	3

LDC # 60984C

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
2	DDE	35668405	83135974	25.000	1.690	10.00	15.85	1.00	0.90	4.44	4.44	0
	CLP2											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984C
SDG #: L2506464 Services
Laboratory: ~~Alpha~~ Analytical, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-250205 (same SDG)
VI	Surrogate Spikes /IS	A/A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results <RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-11R-0-0.5	L2506464-01		Soil	02/05/2025	Category B
2	TS-11R-0-0.5MS	L2506464-01MS	MS	Soil	02/05/2025	Category B
3	TS-11R-0-0.5MSD	L2506464-01MSD	MSD	Soil	02/05/2025	Category B

Notes:

WG2028215 - Blk 1		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?		√		
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?	√			
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC# 60984C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer:__JVG__

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST21	9/5/2024	1260-1 (CLP1)	0.065	0.065	0.061	0.061	10.99	10.66
			1260-1 (CLP2)	0.066	0.066	0.062	0.062	9.61	9.30

LDC# 60984C

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standar
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG2028422-1	02/10/25	1260-1 (CLP1)	0.061	0.051	0.051	16.4	16.4
			1260-1 (CLP2)	0.062	0.051	0.051	17.7	17.7

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG__

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	424.218	85	85	0
Tetrachloro-m- xylene	RTX-CLP2	500	395.798	79	79	0
Decachlorobiphenyl	RTX-CLP1	500	409.091	82	82	0
Decachlorobiphenyl	RTX-CLP2	500	418.233	84	84	0

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	331	322	0	258	394	78	78	122	122	42	42

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer:__JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: __WG2028215-2,3 LCS/D__

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	6	Recalc.
1260	308	301	265	243	86	86	81	81	8	9

LDC#: 60984C

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
LCS	1260	2.318E+08	3.517E+08	250	0.061	5.00	10.14	1.00	NA	**2716.3**	2715.9	0
	CLP1											
											Reported	
	1260-Total =	(2716.3+2760.108+2600.985+2692.149+2677.288)						conc =	(2689.37)(5mL)		**final conc**	
			5						(10.14g)(5mL)			
	=	2689.37						=	**265.2**		**265.0**	
	clean-up vol = 5 mL											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2506464
Reviewer:	Skylar Gerace and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
TS-11R-0-1.5	L2506464-01	Metals, Wet Chemistry
TS-13R-0-1	L2506464-27	Metals, Wet Chemistry
TS-11R-0-1.5MS	L2506464-01MS	Metals, Wet Chemistry
TS-11R-0-1.5MSD	L2506464-01MSD	Metals, Wet Chemistry
TS-11R-0-1.5DUP	L2506464-01DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-250205
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 5, 2025 and were analyzed for metals by SW-846 methods 6010D and 7471B and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	28.2 mg/Kg	141 mg/Kg	TS-11R-0-1.5 TS-13R-0-1

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB-250205 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-250205	Calcium	0.132 mg/L	0.66 mg/Kg	TS-11R-0-1.5
	Iron	0.0534 mg/L	0.267 mg/Kg	TS-13R-0-1
	Magnesium	0.0245 mg/L	0.1225 mg/Kg	
	Sodium	0.472 mg/L	2.36 mg/Kg	
	Zinc	0.0021 mg/L	0.05 mg/Kg	

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250205 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TS-11R-0-1.5MS/MSD (TS-11R-0-1.5 TS-13R-0-1)	Antimony	38 (75-125)	39 (75-125)	J (all detects) UJ (all non-detects)
	Zinc	-	68 (75-125)	J (all detects) UJ (all non-detects)
TS-11R-0-1.5MS/MSD (TS-11R-0-1.5 TS-13R-0-1)	Copper	127 (75-125)	-	J (all detects)

For TS-11R-0-1.5MS/MSD, no data were qualified for several percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

All criteria were met.

Serial Dilution

Metals

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
TS-11R-0-1.5 TS-13R-0-1	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984C
SDG #: L2506464
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB-250205
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID 1.5	Lab ID	QC Type	Matrix	Date	Stage
1	TS-11R-0-~~0.5~~ 2x, all but Hg, matrix	L2506464-01		Soil	02/05/2025	Category B
2	TS-13R-0-1 2x, all but Hg, matrix	L2506464-27		Soil	02/05/2025	Category B
3	TS-11R-0-0.5MS	L2506464-01MS	MS	Soil	02/05/2025	Category B
4	TS-11R-0-0.5MSD	L2506464-01MSD	MSD	Soil	02/05/2025	Category B

Notes:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
Were all water samples preserved to a pH of <2.			x	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			x	
Were %RSDs of isoptoes in the tuning solution ≤5%?			x	
III./IV. Calibration				
Were all instruments calibrated daily?	x			
Were the proper standards used?	x			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	x			
Were the low level standard checks within 70-130%?			x	
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
V. Interference Check Sample				
Were the interference check samples performed daily?	x			
Were the AB solution recoveries within 80-120%?	x			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?	x			
Was there contamination in the initial and continuing calibration blanks?		x		
VII. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?	x			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		x		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	x			
X. Serial Dilution				
Were all percent differences <10%?	x			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		x		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			x	
If the recoveries were outside the limits, was a reanalysis performed?			x	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	s	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
1-2	s	7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1-2

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**					
Fe	28.2		141					

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L Associated sample units: mg/kg
Sampling Date: 02/05/25 09:30 Associated Samples: 1-2

			Sample Identification					
Analyte	Blank ID	Action Level						
	FB-250205							
Ca	0.132	0.66						
Fe	0.0534	0.267						
Mg	0.0245	0.1225						
Na	0.472	2.36						
Zn	0.0021	0.05						

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	s	Sb	38	39	75-125			1-2	J/UJ/A	ND
		Cu	127		75-125			1-2	Jdet/A	Det
		Zn		68	75-125			1-2	J/UJ/A	Det

Comment: 3-4 (mult. analytes): >4x, %R

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Ba	0.463	0.5	92.6	93	Y
CCV	ICP	Cr	0.498	0.5	99.6	100	Y
ICSAB	ICP	Ca	467	500	93.4	93	Y
ICV	CVAA	Hg	0.0029	0.003	96.66666667	96	Y
CCV	CVAA	Hg	0.0047	0.005	94	95	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG2029076-2	LCS	Al	161	160	100.625	101	Y
3	MS	Ag	4.21	4.31	97.67981439	98	Y
4	Duplicate	Ag	4.16	4.21	1.19474313	1	Y
1 PDS	PDS	Sb	38.7	43.4	89.17050691	89	Y
1 SD	Serial dilution	Mg	8030	8150	1.472392638	1	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Pb	0.1821	2	1.281	50	90	15.8	15.79495186	Y
2	Hg	0.000441	1	0.351	50	90	0.07	0.06980057	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984C
SDG #: L2506464
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1 / 1
Reviewer: SG
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB=FB-250205
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No dilutions, MDL<no samples <RL
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-11R-0-~~0.5~~1.5	L2506464-01		Soil	02/05/2025	Category B
2	TS-13R-0-1	L2506464-27		Soil	02/05/2025	Category B
3	TS-11R-0-0.5MS	L2506464-01MS	MS	Soil	02/05/2025	Category B
4	TS-11R-0-0.5MSD	L2506464-01MSD	MSD	Soil	02/05/2025	Category B
5	TS-11R-0-0.5DUP	L2506464-01DUP		Soil	02/05/2025	Category B

Notes:

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	x			
Were the proper number of standards used?	x			
Were all initial and continuing calibration verifications within the QC limits?	x			
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
Were balance checks performed as required?	x			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
V. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?		x		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	x			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	x			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1-2	Cr(VI)
QC	
3-5	Cr(VI)

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.212	0.2		106	106	Y
Calibration verification	Cr(VI)	0.211	0.2		105.5	105	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG2028954-2	LCS	Cr(VI)	72.1	76.1	94.74375821	95	Y
3	MS	Cr(VI)	1330	1440	92.36111111	92	Y
4	Duplicate	Cr(VI)	89.0625	92.36111111	3.636363636	4*	Y
1 PDS	PDS	Cr(VI)	182	182	100	100	Y

Comment: ~~*MS/MSD spike not comparable (text)~~

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0.00367902	1	2.4437	100	90	ND	0.167279143	Y
2	Cr(VI)	0	1	2.4742	100	90	ND	0	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2506645
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
TS-07R-1-1.5	L2506645-26	SVOC, Pesticide
TS-08R-0-3.5	L2506645-38	VOC, SVOC, Pesticide, PCB
TS-07R-1-1.5MS	L2506645-26MS	SVOC, Pesticide
TS-07R-1-1.5MSD	L2506645-26MSD	SVOC, Pesticide
TS-08R-0-3.5MS	L2506645-38MS	Pesticide, PCB
TS-08R-0-3.5MSD	L2506645-38MSD	Pesticide, PCB

Associated QC Samples(s):

Field/Trip Blanks: TB-250206, FB-250206
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 6, 2025 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, and herbicides by SW-846 method 8151A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
01/10/25	ICAL VOA131	1,4-Dioxane	0.003 (≥0.005)	TS-08R-0-3.5	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
01/10/25	V10240515N18	Acetone	34.5	TS-08R-0-3.5	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/12/25	V31250212N02	Dichlorodifluoromethane	45.7	TS-08R-0-3.5	UJ (all non-detects)
		Chloromethane	28.1		UJ (all non-detects)
		Vinyl chloride	22.3		UJ (all non-detects)
		Acetone	37.0		UJ (all non-detects)
		Vinyl acetate	32.8		UJ (all non-detects)
		Hexachlorobutadiene	20.7		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
02/12/25	V31250212N02	1,4-Dioxane	0.00274 (≥0.005)	TS-08R-0-3.5	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
02/11/25	ABN0211.D	Benzoic acid	22.2	TS-07R-1-1.5	J (all detects)
		Hexachlorobutadiene	23.4		UJ (all non-detects)
		Hexachlorocyclopentadiene	50.5		
		3-Nitroaniline	26.9		
		4-Nitroaniline	22.6		
		Pentachlorophenol	24.9		
		Di-n-butylphthalate	20.5		
		Butyl benzyl phthalate	32.5		
		Bis(2-ethylhexyl)phthalate	32.6		
		Di-n-octylphthalate	37.6		
02/11/25	ADP0211.D	1,4-Dioxane	24.6	TS-07R-1-1.5	J (all detects)
					UJ (all non-detects)
02/13/25	ABN0213.D	Benzoic acid	20.6	TS-08R-0-3.5	UJ (all non-detects)
		4-Chloroaniline	23.9		UJ (all non-detects)
		Hexachlorobutadiene	20.6		UJ (all non-detects)
		Hexachlorocyclopentadiene	67.2		UJ (all non-detects)
		3-Nitroaniline	22.1		UJ (all non-detects)
		4-Nitroaniline	22.3		UJ (all non-detects)
		Pentachlorophenol	23.7		UJ (all non-detects)
		Di-n-butylphthalate	20.4		UJ (all non-detects)
		Butyl benzyl phthalate	26.4		UJ (all non-detects)
		Bis(2-ethylhexyl)phthalate	31.7		UJ (all non-detects)
		Di-n-octylphthalate	35.2		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide, PCB

All criteria were met.

Blanks

VOC

Contamination was not detected in the method blanks.

No positive results were found in the trip blank sample TB-250206 and field blank sample FB-250206 for VOC analysis.

SVOC, Pesticide, PCB

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250206 for SVOC, pesticide, and PCB analyses.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

SVOC

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (Limits)	MSD %R (Limits)	Validation Action
TS-07R-1-1.5MS/MSD (TS-07R-1-1.5)	Hexachlorocyclopentadiene	13 (40-140)	13 (40-140)	UJ (all non-detects)
	4-Chloroaniline	36 (40-140)	-	UJ (all non-detects)
TS-07R-1-1.5MS/MSD (TS-07R-1-1.5)	2-Nitroaniline	150 (47-134)	140 (47-134)	None
	3-Nitroaniline	150 (26-129)	140 (26-129)	
	4-Nitroaniline	160 (41-125)	150 (41-125)	
	p-Chloro-m-cresol	110 (26-103)	110 (26-103)	
	2-Chlorophenol	130 (25-102)	120 (25-102)	
	Phenol	100 (26-90)	100 (26-90)	

No data were qualified due to high %Rs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

VOC

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Pesticide, PCB

All criteria were met.

LCS Results

VOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Validation Action
WG2029868-3,4 LCS/LCSD (TS-08R-0-3.5)	Vinyl acetate	67 (70-130)	-	UJ (all non-detects)

Relative percent differences (RPD) were within QC limits.

SVOC

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (≤50)	Validation Action
WG2028329-2,3 LCS/LCSD (TS-07R-1-1.5 TS-08R-0-3.5)	2,4-Dinitrophenol 4,6-Dinitro-o-cresol	70 67	None

No data were qualified due to high RPDs when the associated results were non-detected.

Relative percent differences (RPD) were within QC limits.

Pesticide, PCB

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the SVOC and pesticide analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC and PCB analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	SVOC Analysis Reported
TS-08R-0-3.5	10-fold dilution due to nature of sample matrix

Dilutions were not required for VOC, pesticide, and PCB analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
TS-08R-0-3.5	Heptachlor	42	J (all detects)
	4,4'-DDE	167	J (all detects)
	4,4'-DDD	106	J (all detects)
	cis-Chlordane	50	J (all detects)
	trans-Chlordane	48	J (all detects)
	Chlordane	51	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984D
SDG #: L2506645
Laboratory: ~~Alpha~~ Pace Analytical Services, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Volatiles (EPA 8260D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	TB = TB-250206 (same SDG) FB = FB- J J
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	no results < RL *
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-08R-0-0.5	L2506645-38		Soil	02/06/2025	Category B

Notes:

WG2029868-5 Blk		

Method: Volatiles (EPA SW 846 Method 8260D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) < 30%?		√		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks were identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	√			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the analyte?	√			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	1/10/2025	ICAL VOA131	1,4-Dioxane		0.003 (≥0.005)	All (ND)	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60951D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤30%)	Associated samples	Qualifications
	1/10/2025	V10240515N18	Acetone	34.5	ALL (ND)	J/UJ/A

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG _

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	2/12/2025	V31250212N02	Dichlorodifluoromethane	45.7		All (ND)	J/UJ/A
			Chloromethane	28.1			
			Vinyl chloride	22.3			
			Acetone	37.0			
			Vinyl acetate	32.8			
			Hexachlorobutadiene	20.7			
			1,4-Dioxane		0.00274 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG2029868-3,4 LCS/D	Vinyl acetate	67	-	70-130			All (ND)	J/UJ/P

LDC #: 60984D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 20 std)	Recalculated RRF (RRF 20 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL VOA131	01/10/25	Benzene (FBZ)	0.866	0.866	0.853	0.853	10.00	9.99
			Ethylbenzene (CBZ)	1.474	1.474	1.469	1.469	6.86	6.85
			Naphthalene (DCB)	2.157	2.157	2.206	2.206	6.04	6.05

LDC #: 60984D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported % D	Recalculated %D
1	V31250212N02	02/12/25 19:47	Benzene	(FBZ)	0.853	0.811	0.811	4.9	4.9
			Ethylbenzene	(CBZ)	1.469	1.342	1.342	8.6	8.6
			Naphthalene	(DCB)	2.206	2.085	2.085	5.5	5.5

LDC# 60984D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/L)	Surrogate Found (ug/L)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	20.0	19.66	98	98	0
1,2-Dichloroethane-d4	20.0	21.74	109	109	0
Toluene-d8	20.0	19.36	97	97	0
4-Bromofluorobenzene	20.0	19.99	100	100	0

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2029868-3,4 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	40.00	40.00	33.751	32.340	84	84	81	81	4	4
Benzene	40.00	40.00	38.045	35.935	95	95	90	90	5	6
Trichloroethene	40.00	40.00	40.487	36.712	101	101	92	92	9	10
Toluene	40.00	40.00	36.104	33.433	90	90	84	84	7	8
Chlorobenzene	40.00	40.00	37.198	34.994	93	93	88	87	6	6

VALIDATION FINDINGS WORKSHEET

Sample Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260D)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Vp)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vp = Volume purged
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Ci (ug/L)	RRF	(Analytical) DF	Vp (mL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
1	Naphthalene	325716	111221	20.0	2.206	1.0	5.00	5.90	0.87	25.86	26	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984D
SDG #: L2506645
Laboratory: ~~Alpha~~ Pace Analytical Services, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: AVK
2nd Reviewer:

Method: Semivolatiles (EPA 8270E)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ≥ 0.30
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250206 (same SDG)
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	SW	
IX	Laboratory Control Sample	SW	LCS/D
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	Results <RL >MDL = Jdets
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-07R-1-1.5	L2506645-26		Soil	02/06/2025	Category B
2	TS-08R-0-0.5 10X	L2506645-38		Soil	02/06/2025	Category B
3	TS-07R-1-1.5MS	L2506645-26MS	MS	Soil	02/06/2025	Category B
4	TS-07R-1-1.5MSD	L2506645-26MSD	MSD	Soil	02/06/2025	Category B

Notes:

WG2028329-1 Blk		

LDC#: 60984D

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG

Method: SVOC (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/MS Instrument performance check (Not required)				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	√			
Were all samples analyzed within the 12 hour clock criteria?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20% and relative response factors (RRF) ≥ 0.05?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤30%?	√			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	√			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		√		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was a laboratory blank analyzed for each matrix and concentration?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes				
Were all surrogate percent differences (%R) within QC limits?	√			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			√	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		√		

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		√		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Internal standards				
Were internal standard area counts within -50% or +100% or % Recoveries within 50-200% of the associated calibration standard?	√			
Were retention times within ± 30 seconds of the associated calibration standard?	√			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	√			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	√			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	√			
Were chromatogram peaks verified and accounted for?	√			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤ 20%)	RRF (Limits)	Associated samples	Qualifications
	2/11/2025	ABN0211.D	Benzoic Acid	22.2		1, 3, 4 (ND+DET)	J/UJ/A
			Hexachlorobutadiene	23.4			
			Hexachlorocyclopentadiene	50.5			
			3-Nitroaniline	26.9			
			4-Nitroaniline	22.6			
			Pentachlorophenol	24.9			
			Di-n-butylphthalate	20.5			
			Butyl benzyl phthalate	32.5			
			Bis(2-ethylhexyl)phthalate	32.6			
			Di-n-octylphthalate	37.6			
		ADP0211.D	1,4-Dioxane	24.6			
	2/13/2025	ABN0213.D	Benzoic Acid	20.6		2 (ND)	
			4-Chloroaniline	23.9			
			Hexachlorobutadiene	20.6			
			Hexachlorocyclopentadiene	67.2			
			3-Nitroaniline	22.1			
			4-Nitroaniline	22.3			
			Pentachlorophenol	23.7			
			Di-n-butylphthalate	20.4			
			Butyl benzyl phthalate	26.4			
			Bis(2-ethylhexyl)phthalate	31.7			
			Di-n-octylphthalate	35.2			

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.

Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

MS/MSD ID	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications
3/4	Hexachlorocyclopentadiene	13	13	40-140			1 (ND)	J/UJ/A
	4-Chloroaniline	36	-	40-140				J/UJ/A
	2-Nitroaniline	150	140	47-134				J det/A
	3-Nitroaniline	150	140	26-129				
	4-Nitroaniline	160	150	41-125				
	p-Chloro-m-cresol	110	110	26-103				
	2-Chlorophenol	130	120	25-102				
	Phenol	100	100	26-90				

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method.

Percent recoveries (%R) and Relative percent differences (RPD) were within QC limits with the exceptions identified below.

LCS/LCSD	Analyte	LCS %R	LCSD %R	%R Limits	RPD	RPD Limits	Associated samples	Qualifications (Code)
WG2028329-2,3 LCS/D	2,4-Dinitrophenol				70	50	ALL (ND)	J det/P
	4,6-Dinitro-o-cresol				67	50		

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ___JVG___

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50 std)	Recalculated RRF (RRF 50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL JULIET	8/24/2024	Phenol (DCB)	1.642	1.642	1.576	1.576	3.17	3.18
			Naphthalene (NPT)	1.035	1.035	1.024	1.024	4.53	4.53
			Diethylphthalate (ANT)	1.320	1.320	1.315	1.315	2.79	2.80
			Fluoranthene (PHN)	1.344	1.344	1.282	1.282	4.21	4.22
			Chrysene (CRY)	1.214	1.214	1.196	1.196	2.52	2.52
			Benzo(g,h,i)perylene (PRY)	1.075	1.075	1.058	1.058	5.98	6.00

LDC#: 60984D

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG

METHOD: GC/MS SVOA (EPA SW 846 Method 8270E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound

Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	ABN0211	02/11/25 9:25	Phenol (DCB)	1.576	1.467	1.467	6.9	6.9
			Naphthalene (NPT)	1.024	0.987	0.987	3.6	3.6
			Diethylphthalate (ANT)	1.315	1.415	1.415	7.6	7.6
			Fluoranthene (PHN)	1.282	1.244	1.244	3.0	3.0
			Chrysene (CRY)	1.196	1.205	1.205	0.8	0.8
			Benzo(g,h,i)perylene (PRY)	1.058	1.177	1.177	11.2	11.2
2	ABN0213	02/13/25 9:52	Phenol (DCB)	1.576	1.407	1.407	10.7	10.7
			Naphthalene (NPT)	1.024	0.994	0.994	2.9	2.9
			Diethylphthalate (ANT)	1.315	1.406	1.406	6.9	6.9
			Fluoranthene (PHN)	1.282	1.315	1.315	2.6	2.6
			Chrysene (CRY)	1.196	1.205	1.205	0.8	0.8
			Benzo(g,h,i)perylene (PRY)	1.058	1.131	1.131	6.9	6.9

LDC # 60984D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked (ug/mL)	Surrogate Found (ug/mL)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.000	24.169	97	97	0
2-Fluorobiphenyl	25.000	21.756	87	87	0
Terphenyl-d14	25.000	22.496	90	90	0
Phenol-d5	50.000	59.896	120	120	0
2-Fluorophenol	50.000	59.419	119	119	0
2,4,6-Tribromophenol	50.000	57.523	115	115	0

LDC # 60984D

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added
MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | * 2/(MS + MSD)

MS/MSD ID: 3/4

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (on-col) (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.00	40.00		40.658	39.533	100	102	100	99	0	3
N-Nitroso-di-n-propylamine	40.00	40.00		37.146	35.232	95	93	89	88	7	5
4-Chloro-3-methylphenol	40.00	40.00		45.149	43.120	110	113	83	110	6	5
Acenaphthene	40.00	40.00		39.191	39.358	100	98	100	98	0	0
Pentachlorophenol	40.00	40.00		40.276	36.686	100	101	89	92	13	9
Pyrene	40.00	40.00		40.395	38.013	100	101	95	95	6	6

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2028329-2,3 LCS/D

Compound	SA (ug/Kg)		SSC (on-col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	40.0	40.0	35.918	29.330	90	90	73	73	21	20
N-Nitroso-di-n-propylamine	40.0	40.0	34.987	29.680	87	87	74	74	16	16
4-Chloro-3-methylphenol	40.0	40.0	38.913	32.625	97	97	82	82	17	18
Acenaphthene	40.0	40.0	37.577	31.523	94	94	79	79	17	18
Pentachlorophenol	40.0	40.0	37.684	31.658	94	94	79	79	17	17
Pyrene	40.0	40.0	39.720	32.384	99	99	81	81	20	20

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC/MS SVOC (EPA SW 846 Method 8270E)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Ci = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
Vi = Volume injected
%S = % Solids

Sample #	Compound	Ax	Ais	Ci (ug/mL)	RRF	DF	Ve (uL)	Vo (g)	% Solids	Calculated Concentration (ug/Kg)	Reported Concentration (ug/Kg)	% Diff
2	Fluoranthene	2170820	781705	40.0	1.282	10.00	1000.0	30.36	0.8743	32643.0	33000.0	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984D
SDG #: L2506645
Laboratory: ~~Alpha~~ Pace Analytical Services, ~~Inc.~~, Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVC
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% r² ICV ≤ 20%
IV	Continuing Calibration	A	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = 250206 (Same SDG)
VII	Surrogate Spikes / IS	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-07R-1-1.5	L2506645-26		Soil	02/06/2025	Category B
2	TS-08R-0-~~0~~3.5	L2506645-38		Soil	02/06/2025	Category B
3	TS-07R-1-1.5MS	L2506645-26MS	MS	Soil	02/06/2025	Category B
4	TS-07R-1-1.5MSD	L2506645-26MSD	MSD	Soil	02/06/2025	Category B
5	TS-08R-0-0.5MS	L2506645-38MS	MS	Soil	02/06/2025	Category B
6	TS-08R-0-0.5MSD	L2506645-38MSD	MSD	Soil	02/06/2025	Category B

Notes:

WG2028648-1 PBlk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)
RLs /LOQs were adjusted for sample dilutions and dry weight.
The reported results for detected target analytes agree within 10.0% of the recalculated results.
The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2	Heptachlor	42	J det/A
		4,4'-DDE	167	
		4,4'-DDD	106	
		cis-Chlordane	50	
		trans-Chlordane	48	
		Chlordane	51	

Note: trans-Chlordane results in one col too high

LDC# 60984D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST20	1/3/2025	Dieldrin (CLP1)	1.164	1.164	1.238	1.239	7.32	7.31
			4,4'-DDT (CLP1)	1.044	1.044	1.094	1.094	5.72	5.72
			Dieldrin (CLP2)	1.122	1.122	1.141	1.141	2.38	2.39
			4,4'-DDT (CLP2)	1.019	1.018	1.032	1.032	2.63	2.63

LDC# 60984D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG1939755-1	06/26/24	Dieldrin (CLP1)	1.238	1.294	1.294	4.5	4.5
			4,4'-DDT (CLP1)	1.094	1.057	1.057	3.4	3.4
			Dieldrin (CLP2)	1.141	1.260	1.260	10.4	10.4
			4,4'-DDT (CLP2)	1.032	1.046	1.046	1.4	1.4

LDC # 60984D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	44.28	89	89	0
Tetrachloro-m- xylene	CLP2	50.0	45.76	92	92	0
Decachlorobiphenyl	CLP1	50.0	37.52	75	75	0
Decachlorobiphenyl	CLP2	50.0	40.47	81	81	0

LDC # 60984D

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 3/4

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	38.2	38.3	0	36.8	37.7	96	96	98	98	2	2
DDT	38.2	38.3	4.32	40.0	40.6	93	93	95	95	1	1

LDC # 60984D

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG2028648-2,3 LCS/D_

Compound	SA		SSC (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.7	32.9	32.5	32.2	102	103	98	98	6	1
DDT	31.7	32.9	32.9	32.4	104	104	98	98	6	2

LDC # 60984D

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
2	DDT	263900000	145800000	25.000	1.032	10.00	15.11	1.00	0.87	33.19	33.20	0
	CLP2											

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984D
SDG #: L2506645
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: DVG
2nd Reviewer: V

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A / A	
II	Initial Calibration/ ICV	A / A	RSD ≤ 20% ICV ≤ 20%
III	Continuing Calibration	A	CCV ≤ 20%
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-250206 (same SDG)
VI	Surrogate Spikes	A	
VII	Matrix Spike/Matrix Spike Duplicate	A	
VIII	Laboratory Control Sample	A	LCSD
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	no results < RL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-08R-0-0.5	L2506645-38		Soil	02/06/2025	Category B
2	TS-08R-0-0.5MS	L2506645-38MS	MS	Soil	02/06/2025	Category B
3	TS-08R-0-0.5MSD	L2506645-38MSD	MSD	Soil	02/06/2025	Category B

Notes:

WG2028693-1 PBW		

Method: PCBs (EPA SW 846 Method 8082A)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?			√	
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?			√	
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?			√	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			√	
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?	√			
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			√	
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?			√	
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (500 std)	Recalculated RRF (500 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST19	2/4/2025	1260-1 (CLP1)	0.050	0.050	0.051	0.051	6.69	6.53
			1260-1 (CLP2)	0.052	0.052	0.054	0.054	10.15	10.46

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC PCBSs (EPA SW 846 Method 8082A)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG2028832-1	02/11/25	1260-1 (CLP1)	0.051	0.060	0.060	17.6	17.6
			1260-1 (CLP2)	0.054	0.055	0.055	1.9	1.9

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: _JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Recalculated	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	RTX-CLP1	500	472.643	95	95	0
Tetrachloro-m- xylene	RTX-CLP2	500	450.916	90	90	0
Decachlorobiphenyl	RTX-CLP1	500	461.065	92	92	0
Decachlorobiphenyl	RTX-CLP2	500	454.807	91	91	0

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD ID: 2/3

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1260	342	347	126	435	443	90	90	91	91	2	2

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer:_JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG2028693-2,3 LCS/D__

Compound	SA (u/Kg)		SSC (u/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	6	Recalc.
1260	296	298	334	324	113	113	109	109	4	3

LDC#: 60984D

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

Reviewer:_JVG_

METHOD: GC PCB (EPA SW 846 Method 8082A)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (ml)	Vo (g)	DF	% Solids/100	Calculated on-col conc (ug/Kg)	Reported on-col conc (ug/Kg)	% Diff
1	1260-3	8.195E+07	5.196E+08	250	0.043	5.00	10.69	1.00	0.8743	**913.6**	913.8	0
	CLP1											
											Reported	
	1260-Total =	(913.6+1290.482+1319.624)						conc =	(1174.628(5mL)		**final conc**	
		3							(10.69g)(5mL)(0.8743)			
	=	1174.57						=	**125.7**		**126.0**	
	clean-up vol = 5 mL											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2506645
Reviewer:	Skylar Gerace and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
TS-07R-1-1.5	L2506645-26	Metals, Wet Chemistry
TS-08R-0-3.5	L2506645-38	Metals, Wet Chemistry
TS-07R-1-1.5MS	L2506645-26MS	Metals, Wet Chemistry
TS-07R-1-1.5MSD	L2506645-26MSD	Metals, Wet Chemistry
TS-08R-0-3.5MS	L2506645-38MS	Metals, Wet Chemistry
TS-08R-0-3.5MSD	L2506645-38MSD	Metals, Wet Chemistry
TS-08R-0-3.5DUP	L2506645-38DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-250206
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 6, 2025 and were analyzed for metals by SW-846 methods 6010D and 7471B and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
PB (prep blank)	Iron	0.742 mg/Kg	3.71 mg/Kg	TS-08R-0-3.5

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the field blank sample FB-250206 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
FB-250206	Calcium	0.0652 mg/L	0.326 mg/Kg	TS-07R-1-1.5
	Sodium	0.296 mg/L	2 mg/Kg	TS-08R-0-3.5
	Zinc	0.0133 mg/L	0.0665 mg/Kg	

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250206 for wet chemistry analyses.

MS/MSD Results

Metals

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS %R (75-125)	MSD %R (75-125)	Validation Action
TS-07R-1-1.5MS/MSD (TS-07R-1-1.5)	Antimony	32	33	J (all detects)
	Copper	72	-	UJ (all non-detects)
	Magnesium	66	-	
	Zinc	17	126	
TS-08R-0-3.5MS/MSD (TS-08R-0-3.5)	Antimony	32	40	J (all detects)
	Potassium	67	-	UJ (all non-detects)
	Zinc	-	70	
TS-08R-0-3.5MS/MSD (TS-08R-0-3.5)	Chromium	-	137	J (all detects)
	Lead	-	9030	

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (≤20)	Validation Action
TS-07R-1-1.5MS/MSD (TS-07R-1-1.5)	Zinc	28	J (all detects)
TS-08R-0-3.5MS/MSD (TS-08R-0-3.5)	Antimony	24	J (all detects)
	Chromium	26	UJ (all non-detects)
	Lead	190	

For TS-07R-1-1.5MS/MSD and TS-08R-0-3.5MS/MSD, no data were qualified for several percent recoveries (%R) and relative percent differences (RPD) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

All criteria were met.

Serial Dilution

Metals

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
TS-07R-1-1.5	2-fold dilution due to sample matrix for all metals except mercury
TS-08R-0-3.5	4-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984D
SDG #: L2506645
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Metals (EPA 6010D); Mercury (EPA 7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	SW	
VI	Field Blank	SW	FB = FB-250206
VII	Matrix Spike/Matrix Spike Duplicate	SW	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	A	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-07R-1-1.5 2x, all but Hg, matrix	L2506645-26		Soil	02/06/2025	Category B
2 *	TS-08R-0-~~0.5~~ 4x, all but Hg, matrix	L2506645-38		Soil	02/06/2025	Category B
3	TS-07R-1-1.5MS	L2506645-26MS	MS	Soil	02/06/2025	Category B
4	TS-07R-1-1.5MSD	L2506645-26MSD	MSD	Soil	02/06/2025	Category B
5	TS-08R-0-~~0~~3.5MS	L2506645-38MS	MS	Soil	02/06/2025	Category B
6	TS-08R-0-~~0~~3.5MSD	L2506645-38MSD	MSD	Soil	02/06/2025	Category B

Notes:

*TS-08R-0-3.5		

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
Were all water samples preserved to a pH of <2.			x	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			x	
Were %RSDs of isoptoes in the tuning solution ≤5%?			x	
III./IV. Calibration				
Were all instruments calibrated daily?	x			
Were the proper standards used?	x			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	x			
Were the low level standard checks within 70-130%?			x	
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
V. Interference Check Sample				
Were the interference check samples performed daily?	x			
Were the AB solution recoveries within 80-120%?	x			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?	x			
Was there contamination in the initial and continuing calibration blanks?		x		
VII. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?	x			

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)		x		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?		x		
X. Serial Dilution				
Were all percent differences <10%?	x			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		x		
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			x	
If the recoveries were outside the limits, was a reanalysis performed?			x	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	s	6010D	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
1-2	s	7471B	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 2

				Sample Identification				
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**					
Fe	0.742		3.71					

VALIDATION FINDINGS WORKSHEET
Field Blank

Reviewer: SDG

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Associated sample units: mg/kg
Sampling Date: 02/06/25 10:00
Associated Samples: 1-2

			Sample Identification					
Analyte	Blank ID	Action Level						
	FB-250206							
Ca	0.0652	0.326						
Na	0.296	2						
Zn	0.0133	0.0665						

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
3-4	s	Sb	32	33	75-125			1	J/UJ/A	ND
		Cu	72		75-125			1	J/UJ/A	Det
		Mg	66		75-125			1	J/UJ/A	Det
		Zn	17	126	75-125			1	J/UJ/A	Det
5-6	s	Sb	32	40	75-125			2	J/UJ/A	ND
		Cr		137	75-125			2	Jdet/A	Det
		Pb		9030	75-125			2	J/UJ/A	Det
		K	67		75-125			2	J/UJ/A	Det
		Zn		70	75-125			2	J/UJ/A	Det
3-4	s	Zn				28	≤20	1	J/UJ/A	Det
5-6	s	Sb				24	≤20	2	J/UJ/A	ND
		Cr				26	≤20	2	J/UJ/A	Det
		Pb				190	≤20	2	J/UJ/A	Det

Comment:
3-6 (mult. analytes):
>4x, %R, RPD

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	Ca	0.492	0.5	98.4	98	Y
CCV	ICP	Al	0.467	0.5	93.4	93	Y
ICSAB	ICP	Mg	469	500	93.8	94	Y
ICV	CVAA	Hg	0.0028	0.003	93.33333333	93	Y
CCV	CVAA	Hg	0.0102	0.01	102	102	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG2029578-2	LCS	Hg	1.63	1.67	97.60479042	98	Y
5	MS	Ba	151.9	174	87.29885057	87	Y
6	Duplicate	Ba	258	250	3.149606299	3	Y
2 PDS	PDS	Sb	83.4	89.6	93.08035714	93	Y
1 SD	Serial dilution	Mg	3830	3660	4.644808743	5	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	Hg	0.000643	1	0.349	50	83	0.111	0.110988366	Y
2	Zn	0.5741	4	1.277	50	87	103	103.3492651	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984D
SDG #: L2506645
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	FB = FB-250206
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	~~SW~~ A	
VIII	Laboratory Control Sample	A	
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No dilutions, MDL<no samples <RL
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	TS-07R-1-1.5	L2506645-26		Soil	02/06/2025	Category B
2	TS-08R-0-~~0.5~~ 3.5	L2506645-38		Soil	02/06/2025	Category B
3	TS-07R-1-1.5MS	L2506645-26MS	MS	Soil	02/06/2025	Category B
4	TS-07R-1-1.5MSD	L2506645-26MSD	MSD	Soil	02/06/2025	Category B
5	TS-08R-0-0.5MS	L2506645-38MS	MS	Soil	02/06/2025	Category B
6	TS-08R-0-0.5MSD	L2506645-38MSD	MSD	Soil	02/06/2025	Category B
7	TS-08R-0-0.5DUP	L2506645-38DUP	DUP	Soil	02/06/2025	Category B

Notes:

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	x			
Were the proper number of standards used?	x			
Were all initial and continuing calibration verifications within the QC limits?	x			
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
Were balance checks performed as required?	x			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
V. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?		x		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	x			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	x			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1-2	Cr(VI)
QC	
3-7	Cr(VI)

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.204	0.2		102	102	Y
Calibration verification	Cr(VI)	0.207	0.2		103.5	103	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG2028960-2	LCS	Cr(VI)	79.6	76.1	104.5992116	104	Y
3	MS	Cr(VI)	1040	1090	95.41284404	96	Y
4	Duplicate	Cr(VI)	1090	1040	4.694835681	5	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0	1	2.4486	100	83	ND	0	Y
2	Cr(VI)	0.032	1	2.4935	100	87	1.49	1.475099627	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2507419
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
D11R-0.5-1	L2507419-22	Pesticide
F11R-0.5-1	L2507419-40	Pesticide
G03R-6-7.5	L2507419-50	Pesticide
G03R-6-7.5MS	L2507419-50MS	Pesticide
G03R-6-7.5MSD	L2507419-50MSD	Pesticide

Associated QC Samples(s):

Field/Trip Blanks:	FB-250208
Field Duplicate pair:	None Associated

The above-listed soil samples were collected on February 8, 2025 and was analyzed for chlorinated pesticides by SW-846 method 8081B. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/ECD Instrument Performance Checks

All criteria were met.

Initial and Continuing Calibrations

Initial calibration:

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
02/15/25	WG2030628-1	CLP 1	4,4'-DDD	22.9	D11R-0.5-1 F11R-0.5-1 G03R-6-7.5	UJ (all non-detects)
02/15/25	WG2030628-2	CLP1	Chlordane	29.6	D11R-0.5-1 F11R-0.5-1 G03R-6-7.5	UJ (all non-detects)

Blanks

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250208 for pesticide analysis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

All criteria were met.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Internal Standards

All criteria were met.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the pesticide analysis.

Dilutions were not required for pesticide analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

Pesticide

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Validation Action
F11R-0.5-1	Heptachlor epoxide	44	J (all detects)
	cis-Chlordane	102	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984E
SDG #: L2507419
Laboratory: Pace ~~Alpha~~ Analytical, Inc., Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 20%
IV	Continuing Calibration	SW	CCV ≤ 20%
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250208 (same SDG)
VII	Surrogate Spikes /15	A/A	
VIII	Matrix Spike/Matrix Spike Duplicate	A	
IX	Laboratory Control Sample	A	LCS/D
X	Field Duplicate	N	
XI	Target Analyte Quantitation	SW	no results < RL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11R-0.5-1	L2507419-22		Soil	02/08/2025	Category B
2	F11R-0.5-1	L2507419-40		Soil	02/08/2025	Category B
3	G03R-6-7.5	L2507419-50		Soil	02/08/2025	Category B
4	G03R-6-7.5MS	L2507419-50MS	MS	Soil	02/08/2025	Category B
5	G03R-6-7.5MSD	L2507419-50MSD	MSD	Soil	02/08/2025	Category B

Notes:

WG2029804 1 blk		

Method: Chlorinated Pesticides (EPA SW 846 Method 8081)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	√			
Was cooler temperature criteria met?	√			
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?	√			
Were Evaluation mix standards analyzed prior to the initial calibration and at beginning of each 12-hour shift?	√			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	√			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	√			
Were the RT windows properly established?	√			
IIIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) ≤ 20%?	√			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	√			
Were all percent differences (%D) ≤ 20%?		√		
Were all the retention times within the acceptance windows?	√			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	√			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	√			
Was there contamination in the method blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?	√			
Were target analytes detected in the field blanks?		√		
VII. Surrogate spikes/Internal Standards				
Were all surrogate percent recovery (%R) within the QC limits?	√			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			√	

Validation Area	Yes	No	NA	Findings/Comments
If any percent recovery (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			√	
Were internal standard area counts within ± 50% of the average area calculated during calibration?	√			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	√			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	√			
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	√			
Were target analytes detected in the field duplicates?	√			
XI. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	√			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	√			
Were relative percent difference (RPD) of the results between two columns ≤ 40%?		√		
XII. Target analyte identification				
Were the retention times of reported detects within the RT windows?	√			
Were manual integrations performed and found acceptable?	√			
Did the laboratory provide before and after integration printouts?	√			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	√			

LDC#: 60984E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

Continuing calibration standards were analyzed at the required frequencies.

The retention times for all calibrated compounds were within their respective acceptance windows.

All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Analyte	%D (Limit ≤20%)	Associated samples	Qualifications
	2/15/2025	WG2030628-1	CLP1	4,4'-DDD	22.9	All (-BLK) (ND)	J/UJ/A
		WG2030628-2	↓	Chlordane	29.6	↓	↓

LDC#: 60984E

VALIDATION FINDINGS WORKSHEET

Target Analyte Quantitation and Reported RLs

Reviewer: JVG

Method: GC Pesticides/PCB (EPA SW 846 Method 8081/8082)

RLs /LOQs were adjusted for sample dilutions and dry weight.

The reported results for detected target analytes agree within 10.0% of the recalculated results.

The relative percent difference (RPD) of detected analytes between two columns/detectors were <40% except those identified below.

#	Sample ID	Analyte	%RPD Between Two Columns/Detectors	Qualifications
	2	Heptachlor Epoxide	44	J det/A
		cis-Chlordane	102	↓

Comments:___4,4'-DDE reported as a detect but not confirmed on the 2nd column, 2nd column result <MDL_____

LDC#: 60984E

VALIDATION FINDINGS WORKSHEET
Initial Calibration Results Verification

Reviewer: JVG

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound,
S= Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL PEST11	1/6/2025	4,4'-DDE (CLP1)	1.415	1.415	1.327	1.327	11.68	11.68
			Dieldrin (CLP1)	1.338	1.338	1.316	1.316	6.43	6.43
			4,4'-DDE (CLP2)	1.137	1.138	1.178	1.178	5.44	5.46
			Dieldrin (CLP2)	1.102	1.102	1.162	1.162	4.35	4.35

LDC# 60984E

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer:__JVG__

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081B)

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration percent difference (%D) values were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound,
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	WG2030628-1 PEST11	02/15/25	4,4'-DDE (CLP1)	1.327	1.469	1.469	10.7	10.7
			Dieldrin (CLP1)	1.316	1.494	1.494	13.5	13.5
			4,4'-DDE (CLP2)	1.178	1.197	1.197	1.6	1.6
			Dieldrin (CLP2)	1.162	1.240	1.240	6.7	6.7

LDC # 60984E

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer:_JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: __1____

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m- xylene	CLP1	50.0	34.11	68	68	0
Tetrachloro-m- xylene	CLP2	50.0	44.42	89	89	0
Decachlorobiphenyl	CLP1	50.0	38.96	78	78	0
Decachlorobiphenyl	CLP2	50.0	49.96	100	100	0

LDC # 60984E

VALIDATION FINDINGS WORKSHEET
MS/MSD Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where: SSC = Spiked concentration
SA = Spike added
SC = Sample concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike recovery

MSD = Matrix spike duplicate recovery

MS/MSD ID: 4/5

Compound	SA (ug/Kg)		SC (ug/Kg)	SSC (ug/Kg)		MS Percent Recovery		MSD Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	42.6	42.4	0	47.3	47.6	111	111	112	112	1	1
DDT	42.6	42.4	0	50.3	51.6	118	118	122	122	3	3

LDC # 60984E

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

Reviewer: JVG_

METHOD: GC Pesticides (EPA SW 846 Method 8081)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: _WG1941273-2,3 LCS/D_

Compound	SA		SSC (on col) (ug/Kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
g-BHC	31.8	31.9	22.4	24.3	70	70	76	76	8	8
DDT	31.8	31.9	23.8	26.2	75	75	82	82	9	10

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC Pesticides (EPA SW 846 Method 8081)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Ve = Volume extract
Vo = Volume or weight of sample
%S = % Solids

Sample ID	Compound	Ax	Ais	Cis	RRF	Ve (mL)	Vo (g)	DF	% Solids/100	Calculated conc (ug/Kg)	Reported conc (ug/Kg)	% Diff
1	DDE	1816100000	170800000	25.000	1.1780	10.00	15.19	1.00	0.854	174.0	174.0	0
	CLP2											

Site:	Elmwood Preserve
Laboratory:	Alpha Analytical, Inc., Westborough, MA
SDG:	L2507419
Reviewer:	Skylar Gerace and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 9, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
D11R-0.5-1	L2507419-22	Metals
F11R-0.5-1	L2507419-40	Metals, Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks: FB-250208
Field Duplicate pair: None Associated

The above-listed soil samples were collected on February 8, 2025 and were analyzed for metals by SW-846 methods 6010D and 7471B and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

Metals

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (90-110)	Associated Samples	Validation Action
02/17/25	R1931552-3	Arsenic	111	D11R-0.5-1	J (all detects)
		Chromium	113	F11R-0.5-1	J (all detects)

Wet Chemistry

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Contamination was not detected in the method blanks.

No positive results were found in the field blank sample FB-250208 for metals analyses.

Wet Chemistry

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Laboratory Duplicate Results

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Detection Limits Results

No results were reported below the reporting limit (RL) and above the method detection limit (MDL) in the metals and wet chemistry analyses.

Due to high target analyte levels or difficult sample matrix, select samples were analyzed at dilutions. The following table lists the sample dilutions which were performed and the results reported. RLs were elevated accordingly.

Sample	Metals Analyses Reported
D11R-0.5-1 F11R-0.5-1	2-fold dilution due to sample matrix for all metals except mercury

Dilutions were not required for wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984E
SDG #: L2507419
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1
Reviewer: SG
2nd Reviewer: _____

Method: Metals (EPA 6010D); Mercury (EPA 7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	SW	
IV	ICP Interference Check Sample (ICS) Analysis	A	
V	Laboratory Blanks	A	
VI	Field Blank	ND	FB = FB-250208
VII	Matrix Spike/Matrix Spike Duplicate	~~A~~ N	
VIII	Laboratory Duplicate	N	
IX	Serial Dilution	N	
X	Laboratory Control Sample	A	LCS
XI	Field Duplicate	N	
XII	Target Analyte Quantitation	A	MDL < no samples < RL
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	D11R-0.5-12x, all but Hg, matrix	L2507419-22		Soil	02/08/2025	Category B
2	F11R-0.5-12x, all but Hg, matrix	L2507419-40		Soil	02/08/2025	Category B

Notes:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
Were all water samples preserved to a pH of <2.			x	
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			x	
Were %RSDs of isoptoes in the tuning solution ≤5%?			x	
III./IV. Calibration				
Were all instruments calibrated daily?	x			
Were the proper standards used?	x			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	x			
Were the low level standard checks within 70-130%?			x	
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
V. Interference Check Sample				
Were the interference check samples performed daily?	x			
Were the AB solution recoveries within 80-120%?			x	
VI. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
VII. Field Blanks				
Were field blanks identified in this SDG?	x			
Were target analytes detected in the field blanks?		x		

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			x	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			x	
X. Serial Dilution				
Were all percent differences <10%?			x	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			x	
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?			x	
If the recoveries were outside the limits, was a reanalysis performed?			x	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1-2	s	6010D	As, Cr
1-2	s	7470A	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
All initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were performed at the required frequency and were within the acceptance limits with the following exceptions:

Date	Time	Calibration ID	Analyte	%R	%R Limit	Associated Samples	Qualification	Det/ND
02/17/25	07:29	R1931552-3	As	111	90-110	1-2	Jdet/A	Det
			Cr	113				

Comments:

VALIDATION FINDINGS CHECKLIST
Calibration Calculation Verification

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP	As	0.557	0.5	111.4	111	Y
CCV	ICP	Cr	0.515	0.5	103	103	Y
ICV	CVAA	Hg	0.0027	0.003	90	91	Y
CCV	CVAA	Hg	0.0098	0.01	98	98	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG2030933-2	LCS	As	10.4	9.6	108.3333333	108	Y

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids x Initial weight)

Sample ID	Analyte	Raw Data (ppm)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalcuated Result (mg/kg)	Acceptable (Y/N)
1	As	0.0827	2	1.313	50	85	7.38	7.410062273	Y
2	Cr	0.2427	2	1.278	50	74	25.8	25.66298693	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984E
SDG #: L2507419
Laboratory: Alpha Analytical, Inc., Westborough, MA

Date: 5/6/2025
Page: 1/1
Reviewer: SG
2nd Reviewer:

Method: Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	N	
VI	Matrix Spike/Matrix Spike Duplicate	N	
VII	Laboratory Duplicate	N	
VIII	Laboratory Control Sample	A	LCS
IX	Field Duplicate	N	
X	Target Analyte Quantitation	A	No dilutions, MDL < no samples < RL
XI	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	F11R-0.5-1	L2507419-40		Soil	02/08/2025	Category B

Notes:

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	x			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	x			
Were the proper number of standards used?	x			
Were all initial and continuing calibration verifications within the QC limits?	x			
Were all initial calibration correlation coefficients within limits as specifed by the method?	x			
Were balance checks performed as required?	x			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	x			
Was there contamination in the method blanks?		x		
Was there contamination in the initial and continuing calibration blanks?		x		
V. Field Blanks				
Were field blanks identified in this SDG?			x	
Were target analytes detected in the field blanks?			x	
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			x	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			x	
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	x			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	x			

IX. Field Duplicates				
Were field duplicates identifed in this SDG?			x	
Were target analytes detected in the field duplicates?			x	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	x			
Were all soil samples dry weight corrected?	x			
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	x			

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Cr(VI)

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Cr(VI) were recalculated.

Calibration date:

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Cr(VI)	s1	0	0.002	0.999968	0.999968	Y
		s2	0.01	0.01			
		s3	0.1	0.076			
		s4	0.5	0.372			
		s5	1	0.73			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	Cr(VI)	0.203	0.2		101.5	101.5	Y
Calibration verification	Cr(VI)	0.204	0.2		102	102	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG2030910-2	LCS	Cr(VI)	71.3	76.1	93.69250986	94	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Weight (g)	Final Volume (mL)	Percent solids (%)	Reported Result (mg/kg)	Recalculated Result (mg/kg)	Acceptable (Y/N)
1	Cr(VI)	0	1	2.4201	100	74	ND	0	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, Westborough, MA
SDG:	L2511469
Reviewer:	Josephine Go and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	June 6, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
COMPOSITE #1	L2511469-01	PFAS

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed soil sample was collected on February 3, 2025 and was analyzed for perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

LC/MS Instrument Performance Check

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis. These results were qualified as estimated (J) by the laboratory.

Dilutions were not required for PFAS analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 60984F
SDG #: L2511469
Laboratory: ~~Alpha~~ Pace Analytical Services, Inc., Westborough, MA

Date: 5/5/2025
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/SW	
II	LC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	RSD ≤ 20% ICV ≤ 30%
IV	Continuing Calibration/ISC/Bile Salt	A	CCV ≤ 30% ISC ≤ 30%
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Matrix spike/Matrix spike duplicates	N	
VIII	Laboratory Control Sample	A	LCS, LL LCS
IX	Field Duplicate	N	
X	Internal standards	A	EIS NIS
XI	Target Analyte Quantitation	A	Results < RL > MDL = J dets
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	COMPOSITE #1	L2511469-01		Soil	02/03/2025	Category B

(PFOA only)

Notes:

← WG2037949-1 Blk		

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?		√		
Was cooler temperature criteria met?	√			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	√			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	√			
Were all percent relative standard deviations (%RSD) ≤ 20%?	√			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			√	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	√			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were the retention time windows properly established?	√			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	√			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	√			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	√			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	√			
Were all the retention times within the acceptance windows?	√			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	√			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?	√			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	√			
Was there contamination in the laboratory blanks?		√		
VI. Field blanks				
Were field blanks identified in this SDG?		√		
Were target analytes detected in the field blanks?			√	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		√		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			√	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	√			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	√			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		√		
Were target analytes detected in the field duplicates?			√	
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) within limits?	√			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	√			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	√			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?			√	
Did reported results include both branched and linear isomers?	√			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	√			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	√			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	√			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	√			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	√			
Were ion ratios between 50-150%?	√			
Were manual integrations reviewed and found acceptable?			√	
Did the laboratory provide before and after integration printouts?			√	
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	√			

LDC #: 60984F

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF 2.5 STD	Recalculated RRF 2.5 STD	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL LCMS07	2/28/2025	PFOA (M8-PFOA)	0.872	0.872	0.858	0.858	9.34	9.33

LDC #: 60984F

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: JVG

METHOD: LC/MS PFAS (EPA Method 1633)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Conc	Reported Conc (CCV)	Recalculated Conc (CCV)	Reported %R	Recalculated %R
1	SCI07_250311_18	3/11/2024	PFOA (M8-PFOA)	5.000	4.518	4.518	90.4	90.4

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: LC/MS PFAS (EPA Method 1633)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG2037949-3 LCS

Compound	SA (ng/g)		SSC (ng/g)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
					Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	2.0	NA	2.2	NA	108	108				

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: LC/MS PFAS (EPA Method 1633)

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

$$\text{Concentration} = \frac{(Ax)(Cis)(Ve)(Df)}{(Ais)(RRF)(Vo)(\%S)}$$

Where:

Ax = Area or height of the peak for the compound to be measured
Ais = Area or height of internal standard
Cis = Concentration of internal standard
RRF = Average relative response factor
DF = Dilution factor
Vf = Final volume extract
Vo = Volume or weight of sample

Sample #	Compound	Ax	Ais	Cis (ng/mL)	RRF	DF	Vf (mL)	Vo (g)	% S/100	Calculated Concentration (ng/g)	Reported Concentration (ng/g)	% Diff
1	PFOA	41363	489351	2.500	0.858	1.000	4.0	6.15	0.814	0.1968	0.196	0

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Terraphase
222 International Drive, Suite 150
Portsmouth, NJ 03801
ATTN: Ms. Madison Ingling
madison.ingling@terraphase.com

July 21, 2025

SUBJECT: Elmwood Preserve - Data Validation

Dear Ms. Ingling,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 23, 2025. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #61230:

SDG #	**Fraction**
L2527011 L2534650	VOC, SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide, PFAS, Metals, Wet Chemistry

The data validation was performed under Category B guidelines. The analysis was validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan, Elmwood Preserve (January 2025)
- Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023)
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005 (November 2020)
- USEPA National Functional Guidelines for Inorganic Superfund Data Review, EPA 542-R-20-006 (November 2020)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager

LDC #61230 (Terraphase - Portsmouth, NJ / Elmwood Preserve)

LDC	SDG#	Received Date	(21) Due Date	Validation Level	VOCs (8260D)	SVOCs (8270E)	SVOCs (8270E SIM)	1,4-Dioxane (8270E SIM)	Pesticides (8081B)	PCBs (8082A)
Matrix Type:					Water	Water	Water	Water	Water	Water
A	L2527011	6/23/25	7/15/25	Category B	1	1	1	1	1	1
B	L2534650	6/23/25	7/15/25	Category B				1		
Total			PM: PG		**1**	**1**	**1**	**2**	**1**	**1**

LDC	SDG#	Received Date	(21) Due Date	Validation Level	Herbicides (8151A)	PFAS (1633)	Metals (6020B)	Mercury (7470A)	Cyanide (9010C/9012B)	Cr(VI) (7196A)
Matrix Type:					Water	Water	Water	Water	Water	Water
A	L2527011	6/23/25	7/15/25	Category B	1	1	1	1	1	1
B	L2534650	6/23/25	7/15/25	Category B						
Total			PM: PG		**1**	**1**	**1**	**1**	**1**	**1**

These sample counts do not include MS/MSDs and DUPs.
EDD: EQuIS, NYDUSR

WO 20250428

Project# CV04.001.005

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, LLC, Westborough, MA
SDG:	L2527011
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	July 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
RMW-03-250501	L2527011-01	VOC, SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide, PFAS

Associated QC Samples(s):

Field/Trip Blanks: TB-250430, EB-GW-250501
Field Duplicate pair: RMW-03-250501 and DUP-01-250501

The above-listed water sample was collected on May 1, 2025 and were analyzed for volatile organic compounds (VOC) by SW-846 method 8260D, semivolatile organic compounds (SVOC) by SW-846 method 8270E, semivolatile organic compounds (SVOC) by SW-846 method 8270E in Selected Ion Monitoring (SIM) mode, 1,4-dioxane by SW-846 method 8270E in SIM mode, chlorinated pesticides by SW-846 method 8081B, polychlorinated biphenyls (PCB) by SW-846 method 8082A, herbicides by SW-846 method 8151A, and perfluoroalkyl and polyfluoroalkyl substances (PFAS) by method 1633. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025), the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (April 2023), and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- GC/Electron Capture Detector (GC/ECD) Instrument Performance Checks
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

VOC, SVOC, SVOC-SIM, 1,4-Dioxane

All criteria were met.

GC/ECD Instrument Performance Checks

Pesticide, PCB

All criteria were met.

LC/MS Instrument Performance Check

PFAS

All criteria were met.

Initial and Continuing Calibrations

VOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
03/30/25	ICAL-Elaine	1,4-Dioxane	0.00142 (≥0.005)	RMW-03-250501	UJ (all non-detects)

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
03/30/25	ICV-Elaine	1,4-Dioxane	31.4	RMW-03-250501	UJ (all non-detects)

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/15/25	WG2067640-2	Chloromethane	24.8	RMW-03-250501	UJ (all non-detects)
		2-Hexanone	32.1		UJ (all non-detects)
		Bromoform	22.7		UJ (all non-detects)
		n-Propylbenzene	22.7		UJ (all non-detects)
		trans-1,4-Dichloro-2-butene	32.6		UJ (all non-detects)
		n-Butylbenzene	21		UJ (all non-detects)
		1,2-Dibromo-3-chloropropane	23.6		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria with the following exceptions:

Date	Standard ID	Analyte	RRF (Limits)	Associated Samples	Validation Action
05/15/25	WG2067640-2	1,4-Dioxane	0.00137 (≥0.005)	RMW-03-250501	UJ (all non-detects)

SVOC

Initial calibration:

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard ID	Analyte	%D	Associated Samples	Validation Action
05/03/25	WG2061929-3	2-Nitrophenol	21.9	RMW-03-250501	UJ (all non-detects)
		2-Nitroaniline	21.3		UJ (all non-detects)
		2,6-Dinitrotoluene	26.1		UJ (all non-detects)
		4-Nitrophenol	31		UJ (all non-detects)
		4,6-Dinitro-o-cresol	36.3		UJ (all non-detects)
		Butylbenzylphthalate	24.5		UJ (all non-detects)
		Di-n-octylphthalate	24.1		UJ (all non-detects)

All of the continuing calibration relative response factors (RRF) were within validation criteria.

Pesticide

Initial calibration:

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

Continuing calibration:

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Validation Action
05/05/25	WG2062398-4	Ch B	Endrin aldehyde	20.3	RMW-03-250501	UJ (all non-detects)

SVOC-SIM, 1,4-Dioxane, PCB, Herbicide, PFAS

All criteria were met.

Blanks

VOC

Contamination was not detected in the method blanks.

No positive results were found in the trip blank sample TB-250430 for VOC analysis.

Contamination was detected in the equipment blank sample EB-GW-250501 for VOC analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x reporting limits (RL) (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
EB-GW-250501	Chloroform	5.3 ug/L	RL	RMW-03-250501
	Bromodichloromethane	1.2 ug/L	RL	
	Acetone	2.4 ug/L	RL	

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

SVOC

Contamination was detected in the associated SVOC method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG2061848-1	Unknown organic acid	6.9 ug/L	RL	RMW-03-250501

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the equipment blank sample EB-GW-250501 for SVOC analysis.

SVOC-SIM

Contamination was detected in the associated SVOC-SIM method blank samples. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at <2x RL (for common contaminants) and <RL (for other contaminants) of the concentrations detected. The following table summarizes the contamination detected.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
WG2061849-1	Fluoranthene	0.06 ug/L	RL	RMW-03-250501
	Benzo(a)anthracene	0.07 ug/L	RL	
	Benzo(a)pyrene	0.07 ug/L	RL	
	Benzo(b)fluoranthene	0.06 ug/L	RL	
	Benzo(k)fluoranthene	0.07 ug/L	RL	
	Chrysene	0.05 ug/L	RL	
	Anthracene	0.03 ug/L	RL	
	Benzo(g,h,i)perylene	0.07 ug/L	RL	
	Dibenzo(a,h)anthracene	0.06 ug/L	RL	
	Indeno(1,2,3-cd)pyrene	0.07 ug/L	RL	
	Pyrene	0.06 ug/L	RL	

Sample results were qualified as follows:

•If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.
- If the sample concentration was > the RL and > the Action Level, qualification of the data was not required.

No samples were qualified since the associated sample results were nondetect or greater than the action level.

No positive results were found in the equipment blank sample EB-GW-250501 for SVOC-SIM analysis.

PFAS

Contamination was not detected in the method blanks.

Contamination was detected in the equipment blank sample EB-GW-250501 for PFAS analysis. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at the reporting limit (RL) for contaminants. The following table summarizes the contamination detected.

Field Blank ID	Analyte	Level Detected	Action Level	Associated Samples
EB-GW-250501	N-ethylperfluorooctane sulfonamide (NEtFOSA)	0.742 ng/L	RL	RMW-03-250501

Sample results were qualified as follows:

- If sample concentration was < the reporting limit (RL) and ≤ the Action Level, qualify the result as a nondetect (U) at the RL.
- If sample concentration was > the RL and ≤ the Action Level, qualify the result as not detected (U) at the reported concentration.

No samples were qualified since the associated sample results were nondetect.

1,4-Dioxane, Pesticide, PCB, Herbicide

Contamination was not detected in the method blanks.

No positive results were found in the equipment blank sample EB-GW-250501 for 1,4-dioxane, pesticide, PCB, and herbicide analyses.

Surrogate Recoveries

SVOC

Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for sample RMW-03-250501. Using professional judgment, no data were qualified when one base or one acid surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

PFAS

Laboratory control samples (LCS) and low-level laboratory control samples (LLLCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	%R (Limits)	Validation Action
WG2062162-2 (RMW-03-250501)	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	165 (65-145)	None

No data were qualified due to high RPD when the associated results were non-detected.

VOC, SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

Samples RMW-03-250501 and DUP-01-250501-250501were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

VOC

Analyte	Concentration (ug/Kg)		RPD
	RMW-03-250501	DUP-01-250501	
Acetone	1.5U	2.7	Not calculable

PFAS

Analyte	Concentration (ng/L)		RPD
	RMW-03-250501	DUP-01-250501	
Perfluorobutanoic Acid (PFBA)	0.932	0.771	19
Perfluorobutanesulfonic Acid (PFBS)	0.516	0.632	20
Perfluorohexanoic Acid (PFHxA)	0.416	0.486	16
Perfluoroheptanoic Acid (PFHpA)	0.609	0.617	1
Perfluorohexanesulfonic Acid (PFHxS)	0.509	0.478	6
Perfluorooctanoic Acid (PFOA)	5.76	6.06	5
Perfluorooctanesulfonic Acid (PFOS)	4.16	4.24	2
Perfluoropentanoic Acid (PFPeA)	0.347U	0.370	Not calculable

SVOC, SVOC-SIM, 1,4-Dioxane, Pesticide, PCB, Herbicide

No results were detected in any of the samples.

Quantitation Limits and Data Assessment

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the PFAS analysis. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the VOC, SVOC, SVOC-SIM, 1,4-dioxane, pesticide, PCB, and herbicide analyses.

Dilutions were not required for VOC, SVOC, SVOC-SIM, 1,4-dioxane, pesticide, PCB, herbicide, and PFAS analyses.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

PFAS

All target analyte ion ratios met validation criteria with the following exceptions:

Sample	Analyte	Ion Ratio (Limits)	Validation Action
RMW-03-250501	Perfluorohexanoic acid (PFHxA)	0.119 (0.033-0.099)	J (all detects)

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer: EJ
2nd Reviewer: CL

Method: Volatiles (EPA 8260D)

+ TICs

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	SW/SW	%RSD ≤ 20, r² ICV ≤ 30
IV	Continuing Calibration	SW	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	SW	EB = EB-GW-250501
VII	Surrogate Spikes	A	TB = TB-250430
VIII	Matrix Spike/Matrix Spike Duplicate	N	Q5
IX	Laboratory Control Sample	~~SW~~ A	LCS ID
X	Field Duplicate	SW	D = 1, DUP-01 ~~250501~~ FT
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NJ Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2067640-5 Blank K		

LDC #: 61230A

VALIDATION FINDINGS CHECKLIST

Method: Volatiles (EPA SW 846 Method 8260 B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ ~~30%/15%~~ 20% and relative response factors (RRF) ≥ 0.05?		✓		
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ~~< 20%~~ ≤ 30%?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) ≥ 0.05?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?	✓			
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?			✓	
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene	A2. 1,2,4,5-Tetramethylbenzene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane	B2. n-Octane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane	C2. n-Propyl alcohol
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene	D2. n-Pentane
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11	E2. n-Decane
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12	F2. Chlorodifluoromethane
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113	G2. cis-Decahydronaphthalene
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114	H2. trans-Decahydronaphthalene
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane	I2. n-Nonane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide	J2. n-Undecane
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane	K2. Chloroprene
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane	L2. n-Butanol
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane	M2. n-Butyl acetate
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane	N2. Nitrobenzene
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane	O2. Methyl bromide
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane	P2. Methyl chloride
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane	Q2. Methyl iodide
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylene	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane	R2. Methylene bromide
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane	S2.
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane	T2.
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal	U2.
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene	V2.
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol	W2.
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene	X2.
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol	Y2.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. p-Diethylbenzene	Z2.

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

A five point calibration curve was performed.
A linear fit was used for evaluation and acceptance criteria for each analyte was met.
A curve fit was used for evaluation and the r2 acceptance criteria of ≥ 0.99 was met.
Initial calibration was performed was at the required frequency.

Level IV Only

The retention time windows were properly established for all analytes.
All analytes were run at the required concentrations in the initial calibrations.
All criteria are met with the exceptions identified below.

#	Date	Standard ID	Analyte	%RSD (Limit ≤15%/20%%)	RRF (Limits)	Associated samples	Qualifications
	3/30/25	ICAL - Elaine	HHHH		~~0.000~~ 0.00142 (≥0.005)	All	J/UJ/A

	DOD	NFG
RSD	15%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: JF

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
A second source verification standard was analyzed after each ICAL for each instrument.
All analytes met the second source verification standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Analyte	%D (Limit ≤20.0%/30%)	Associated samples	Qualifications
	3/30/25 0749	ICV-Elaine	JJ	31.4	All	J/UJ/A ND

	DOD	NFG
%D	20%	30%

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FJ

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/15/25	WG2067640-2	A	24.8		All	J/UJ/A all ND
	0748	ccv	~~Z~~	32.1			
			X	22.7			
			YY	22.7			
			YYYY	32.6			
			III	21			
			MM	23.6			
			HHHH		0.00137 (≥0.005)		

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.005 - 1,4-Dioxane 0.05 - all other analytes

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Field Blank

Method:GCMS VOA (EPA SW 846 Method 8260 D)

EB = EB-GW-250501

Field blanks were identified in this SDG.
No contaminants were found in the field blanks with the exceptions identified below.

Sampling date: 5/01/25 **Associated sample units:** ug/L

Field blank type: (circle one) Trip Blank/Field Blank / Rinsate / Other: **Associated samples:** All (ND)

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Analyte	Blank ID	Sample Identification						
	EB							
K	5.3							
P	1.2							
F	2.4							

Sampling date: **Associated sample units:**

Field blank type: (circle one) Trip Blank/Field Blank / Rinsate / Other: **Associated samples:**

(TB = Trip Blank; FB = Field Blank; EB = Equipment Blank; SB = Source Blank)

Analyte	Blank ID	Sample Identification						

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: RV

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

Compound	Concentration (ug/L)		RPD (≤ %)	Qualifications (Parent only)
	1	DUP-81-250501		
F	1.54	2.7	NC	

Compound	Concentration ( )		RPD (≤ %)	Qualifications (Parent only)

Compound	Concentration ( )		RPD (≤ %)	Qualifications (Parent only)

Compound	Concentration ( )		RPD (≤ %)	Qualifications (Parent only)

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10ug/L std)	Recalculated (RRF 10ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL Elaine	3/30/2025	V	0.904	0.904	0.853	0.853	7.29	7.29
			CC	0.698	0.698	0.685	0.685	3.60	3.60
			JJJ	1.273	1.273	1.176	1.176	5.69	5.69

LDC # 61230△

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv	5/15/25 0740	Y	0.853	0.81	0.81	5	5
			cc	0.685	0.737	0.737	7.6	7.6
			JJJ	1.176	1.088	1.088	7.5	7.5

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

	Surrogate Spiked (ug/L	Surrogate Found (ug/L	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	10.0	11.359	114	114	0
1,2-Dichloroethane-d4		11.526	115	115	
Toluene-d8		11.306	113	113	
4-Bromofluorobenzene		12.162	122	122	

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG206662 9 - 3/4

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	10	10	9.7	9.3	97	97	93	93	4	4
Trichloroethene	↓	↓	9.8	9.6	98	98	96	96	2	2
Benzene			9.7	9.6	97	97	96	96	1	1
Toluene			8.8	8.8	88	88	88	88	0	0
Chlorobenzene			9.3	9.2	93	93	92	92	1	1

LDC # 61230△

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260 D)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG206740-3/4

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	10	10	8.8	9.2	88	88	92	92	4	4
Trichloroethene			9.2	9.0	92	92	90	90	2	2
Benzene			9.5	9.1	95	95	91	91	4	4
Toluene			11	11	110	110	110	110	0	0
Chlorobenzene	↓	↓	9.9	9.4	99	99	94	94	5	5

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8260

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG206764O - 3(LCS) ✓

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Concentration = $\frac{(234231)\ (10.0)}{(289151)\ (0.853)}$

= 9.497 ug/L

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	V	9.497 ≈ 9.5	~~8.5~~ 9.5	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA
+ TICs
Method: Semivolatiles (EPA 8270E)

Date: 6/24/2025
Page: 1
Reviewer:
2nd Reviewer:

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20, r ICV ≤ 30 CCV ≤ 20
IV	Continuing Calibration	SW	
V	Laboratory Blanks	SW	
VI	Field Blank	ND	EB = EB-GW-250501
VII	Surrogate Spikes	SW	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	ND	D = 1, DUP-01 ~~250501~~ PA
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	ND Results < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2061848-1	SV 112	

LDC #: 61230A

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?		✓		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?		✓		
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Compound	%D (Limit ≤20%)	RRF (Limits)	Associated samples	Qualifications
	5/3/25 0715	WG2061929-3	N	21.9		All	J/UJ/A all ND
			BB	21.3			
			EE	26.1			
			II	31			
			4,6-Dinitro-o-cresol	36.3			
			AAA	24.5			
			FFF	24.1			

	DOD	NFG
%D	20%/50%	20%

RRF: 0.001 - poor performers 0.05 - all other analytes

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 5/3/25 **Associated samples:** All ND
Conc. units: ug/L Extraction date: 5/2/25

Compound	Blank ID	Sample Identification							
	MB1								
TIC unknown organic Acid	6.9								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: ___FT_____

METHOD: GC/MS BNA (EPA SW 846 Method 8270 E)
Surrogates were added to all samples as required by the method.
All surrogate recoveries (%R) were within QC limits with the exceptions identified below.

#	Sample ID	Surrogate Compound	%R	Limits	Qualifications
	1	2FP	20	21 - 120	NQ only 1 out

(NBZ) = Nitrobenzene-d5
(FBP) = 2-Fluorobiphenyl
(TPH) = Terphenyl-d14
(PHL) = Phenol-d5
(2FP)= 2-Fluorophenol
(TBP) = 2,4,6-Tribromophenol
(2MN) = 2-Methylnaphthalene-d10
(FLN) = Fluoranthene-d10
(MNP) = 1-Methylnaphthalene-d10
(2CP) = 2-Chlorophenol-d4
(DCB) = 1,2-Dichlorobenzene-d4

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS SVOA 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:
Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 10 ug/ml std)	Recalculated (RRF 10 ug/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL SV112	3/13/2025	A	1.602	1.602	1.592	1.592	6.99	6.99
			T	0.128	0.128	0.128	0.128	8.03	8.03
			FF	0.331	0.331	0.309	0.309	11.82	11.82
			WW	0.969	0.969	0.974	0.974	8.09	8.09
			BBB	0.470	0.470	0.447	0.447	9.08	9.08

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV	5/3/25	A	1.592	1.609	1.609	1.1	1.1
			TT T	0.128	0.135	0.35	5.5	5.5
			FF	~~1.072~~ 0.309	0.356	0.356	15.2	15.2
			WW	0.974	1.062	1.062	9	9
			BBB	0.447	0.507	0.507	13.4	13.4

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ng/ml)	Surrogate Found (ug/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	1.0	0.732	73	73	0
2-Fluorobiphenyl	↓	0.743	74	74	
Terphenyl-d14	↓	0.839	84	84	
Phenol-d5	2.0	0.406	20	20	
2-Fluorophenol	↓	0.408	20	20	
2,4,6-Tribromophenol	↓	0.667	33	33	↓

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: W9206184S-2/3

Compound	SA (ug/ml)		SSC (ug/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol	2.0	2.0	0.750	0.825	38	38	41	41	8	10
N-Nitroso-di-n-propylamine			1.299	1.430	65	65	72	72	10	10
4-Chloro-3-methylphenol			1.562	1.711	78	78	86	86	10	9
Acenaphthene			1.393	1.528	70	70	76	76	8	9
Pentachlorophenol			0.580	0.781	29	29	39	39	29	30
Pyrene			1.603	1.753	80	80	88	88	10	9

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG206184B-2 (LCS) A

Concentration = $\frac{(8256)(4.0)(1)(1000)}{(27645)(1.592)(100)}$

= 7.5 ug/L

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	A	7.5	7.5	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA
Method: ~~PAHs~~ SVOA (EPA 8270E SIM)

Date: 6/24/2025
Page: 1
Reviewer: AM
2nd Reviewer: CF

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A	%RSD ≤20, r² ICV ≤30
IV	Continuing Calibration	A	CCV ≤20
V	Laboratory Blanks	SW	
VI	Field Blank	ND	EB = EB-GW-250501
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	ND	D-1, DUP-01
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NO Results <RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2061849-1		

Method: Semivolatiles (EPA SW 846 Method 8270 E) SIM

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?		✓		
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)
Method blanks were performed at the required frequency and sequence.
No contaminants were found in the method blanks with the exceptions identified below.
Blank analysis date: 5/5/25 **Associated samples:** All (ND)
Conc. units: ug/L Extraction date: 5/2/25

Compound	Blank ID	Sample Identification							
	MB1								
see following	page								

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification							

Results Summary
Form 1
Semivolatile Organics by GC/MS-SIM

Client	: Terraphase Engineering Inc.	Lab Number	: L2527011
Project Name	: ELMWOOD PRESERVE	Project Number	: CV04.001.004B
Lab ID	: WG2061849-1	Date Collected	: NA
Client ID	: WG2061849-1BLANK	Date Received	: NA
Sample Location	:	Date Analyzed	: 05/05/25 11:03
Sample Matrix	: WATER	Date Extracted	: 05/02/25
Analytical Method	: 1,8270E-SIM	Dilution Factor	: 1
Lab File ID	: 061849-1	Analyst	: SLR
Sample Amount	: 100 ml	Instrument ID	: SV119
Extraction Method	: EPA 3510C	GC Column	: RXI-5SilMS
Extract Volume	: 1000 uL	%Solids	: N/A
GPC Cleanup	: N	Injection Volume	: 1 uL

MB1

CAS NO.	Parameter		ug/L Results	RL	MDL	Qualifier
83-32-9	Acenaphthene		ND	0.10	0.02	U
91-58-7	2-Chloronaphthalene		ND	0.20	0.02	U
206-44-0	Fluoranthene	YY	0.06 ✓	0.10	0.03	J
87-68-3	Hexachlorobutadiene		ND	0.50	0.02	U
91-20-3	Naphthalene		ND	0.10	0.02	U
56-55-3	Benzo(a)anthracene	CCC	0.07 ✓	0.10	0.03	J
50-32-8	Benzo(a)pyrene	III	0.07 ✓	0.10	0.02	J
205-99-2	Benzo(b)fluoranthene	GGG	0.06 ✓	0.10	0.03	J
207-08-9	Benzo(k)fluoranthene	HHH	0.07 ✓	0.10	0.03	J
218-01-9	Chrysene	DDD	0.05 ✓	0.10	0.03	J
208-96-8	Acenaphthylene		ND	0.10	0.02	U
120-12-7	Anthracene	VV	0.03 ✓	0.10	0.02	J
191-24-2	Benzo(ghi)perylene	LLL	0.07 ✓	0.10	0.02	J
86-73-7	Fluorene		ND	0.10	0.03	U
85-01-8	Phenanthrene		ND	0.10	0.04	U
53-70-3	Dibenzo(a,h)anthracene	KKK	0.06 ✓	0.10	0.02	J
193-39-5	Indeno(1,2,3-cd)pyrene	JJJ	0.07 ✓	0.10	0.02	J
129-00-0	Pyrene	ZZ	0.06 ✓	0.10	0.04	J
91-57-6	2-Methylnaphthalene		ND	0.10	0.03	U
87-86-5	Pentachlorophenol		ND	0.80	0.06	U
118-74-1	Hexachlorobenzene		ND	0.80	0.01	U
67-72-1	Hexachloroethane		ND	0.80	0.02	U

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GCMS PAH 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF10ng/ml std)	Recalculated (RRF 10ng/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	12/29/2024	S	1.129	1.129	1.116	1.116	10.81	10.81
	SV119		GG	1.333	1.333	1.334	1.334	6.72	6.72
			UU	1.163	1.163	1.170	1.170	8.58	8.58
			DDD	1.371	1.371	1.377	1.377	6.83	6.83
			III	1.049	1.049	1.125	1.125	6.63	6.63

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C) SIM

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv	5/5/15 0932	S	1.116	1.01	1.01	9.5	9.5
			9G	1.334	1.268	1.268	4.9	4.9
			UU	1.170	1.092	1.092	6.7	6.7
			DDD	1.377	1.25	1.25	9.2	9.2
			111	1.125	1.259	1.259	11.9	11.9

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E SIM

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: 1

Surrogate	Surrogate Spiked ( )	Surrogate Found ( )	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	1000	841.978	84	84	0
2-Fluorobiphenyl	↓	720.002	72	72	↓
Terphenyl-d14	↓	838.027	~~24~~ 84	84	↓
Phenol-d5	2000	485.254	P1 ~~24~~ 24	24	↓
2-Fluorophenol	↓	419.662	~~84~~ 21	21	↓
2,4,6-Tribromophenol	↓	579.783	29	29	↓

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E) SIM

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG2061849-2/3

Compound	SA (~~ug/L~~ ng/mL)		SSC (~~ug/L~~ ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	200U	200U	1532.67	1653.02	77	77	83	83	8	6
Pentachlorophenol										
Pyrene	↓	↓	1629.64	1777.27	81	81	89	89	9	9

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270 E SIM

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG 206184 9-2 (LCS) GG

Concentration = $\frac{(266136)(4000)(1)}{(520638)(1.334)(100)}$

15.32 ug/L

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	GG	15.32 ≈ 15	15	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer:
2nd Reviewer:

Method: 1,4-Dioxane (EPA 8270E SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	GC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	Δ/Δ	% RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration	K	CCV ≤ 20
V	Laboratory Blanks	Δ	
VI	Field Blank	ND	EB = EB-GW-250501
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	Δ	LCS LD
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	Δ	NO Result < PL > MDL
XIII	Target Analyte Identification	Δ	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2072260-1 Blank		

LDC #: 61230A

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270E) SIM

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			✓	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC# 61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS 1,4-Dioxane 8270E SIM

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 500ng/ml std)	Recalculated (RRF 500ng/ml std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	5/2/2025	IIII	1.314	1.314	1.342	1.342	3.46	3.46
	BNA11								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	CCV	5/10/15 0236	1111	1.342	1.356	1.352	1	1

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 C)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ng/ml)	Surrogate Found (ng/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
1,4-Dioxane-D8	500	234.884	47	47	0

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG2072260-2/3

Compound	SA (ng/L)		SSC (ng/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol										
Pyrene										
1,4-Dioxane	5000	5000	5790	5540	116	116	111	111	4	4

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG720722602 (LCS) 1,4-Dioxane

Concentration = $\frac{(16332)(500)(2.5)(1000)}{(10514)(1.342)(250)}$

= 5787.47 ng/L

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ng/L)	Reported Concentration (ng/L)	% Diff
LCS	1,4-Dioxane	5787.47	5790	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer: FT
2nd Reviewer:

Method: Organochlorine Pesticides (EPA 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/ECD Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%D RSD ≤20, r² ICV ≥ 20
IV	Continuing Calibration	SW	CCV ≥ 20
V	Laboratory Blanks	A	
VI	Field Blank	ND	EB = EB-GW-250501
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	CS
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	ND	D = 1, DUP-01
XI	Target Analyte Quantitation	A	NJ Result < RL > MDL
XII	Target Analyte Identification	A	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2062236-1		

LDC #: 61230A

VALIDATION FINDINGS CHECKLIST

Method: ✓GC __HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?	✓			
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?		✓		
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?		✓		
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
Were manual integrations reviewed and found acceptable?	✓		✓	
Did the laboratory provide before and after integration printouts?			✓	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.		✓		

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. trans–Heptachlor epoxide
B. beta-BHC	L. Endosulfan II	V. Aroclor 1016	FF. Hexachlorobenzene	PP. Mirex
C. delta-BHC	M. 4,4'-DDD	W. Aroclor 1221	GG. Chlordane	QQ cis-Chlordane
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor 1232	HH. Chlordane (Technical)	RR. trans-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor 1242	II. Aroclor 1262	SS. Hexachlorobutadiene
F. Aldrin	P. Methoxychlor	Z. Aroclor 1248	JJ. Aroclor 1268	TT. Kepone
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor 1254	KK. Oxychlordane	UU. Chlorpyrifos
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor 1260	LL. trans-Nonachlor	VV
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. cis-Nonachlor	WW.
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. cis–Heptachlor epoxide	XX.

Notes:_____

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: __FT_____

METHOD: ___✓___ **GC** _____ **HPLC**

Continuing calibration standards were analyzed at the required frequencies.
The retention times for all calibrated compounds were within their respective acceptance windows.
All analytes met the continuing calibration standards validation criteria with the exceptions identified below.

#	Date	Standard ID	Column/Detector	Compound	%D (Limit ≤20.0%)	Associated samples	Qualifications
	~~cert~~						
	5/5/25	WG206239B-4	ch B	R	20.3	all	J (all detects) A
	1246	CCV					

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC __X_____ HPLC _____

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported 10.0ug/L	Recalculated 10.0ug/L	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	3/25/2025	Gamma BHC CLP1	1.546	1.546	1.612	1.612	7.99	7.99
	Pest 10		4,4-DDT CLP1	0.912	0.912	0.944	0.944	8.03	8.03
			Gamma BHC CLP2	1.418	1.418	1.557	1.557	6.01	6.01
			4,4-DDT CLP2	1.101	1.101	1.187	1.187	6.80	6.80

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

#	Standard ID	Calibration Date	Compound	CCV Conc	Reported Conc	Recalculated Conc	Reported %R/%D	Recalculated %R/%D
1	CCV	5/5/25 1246	gamma BHC chl	1.612	1.565	1.565	2.9	2.9
			4,4'-DDT	0.944	1.027	1.027	8.8	8.8
2			chB	1.557	1.521	1.521	2.3	2.3
			↓	1.187	1.135	1.135	4.4	4.4
3								
4								
5								
6								
7								
8								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC / HPLC

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
TCMX CLP1	50.0	27.314	55	55	0
↓ 2		36.566	73	73	
PCB CLP1	↓	36.537	73	73	↓
↓ 2		39.258	79	79	

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DC	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic aci	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. Ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC # 61230Δ

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC ✓ HPLC____

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG206223 6-2/3

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma BHC	0.5	0.5	0.458	0.434	92	92	87	87	5	5
4,4'-DDT	↓	↓	0.568	0.527	114	114	105	105	8	8

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC ✓ HPLC _____

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG206226-2 (lcs) 4,4'-DDT

Concentration = $\frac{(183.4 \times 10^6)(25.0)(1)}{(85505714)(0.944)\ 100}$

= 0.568 ug/L

Where:

Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume 1/100

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
lcs	4,4'-DDT	0.568	0.568	

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer: FZ
2nd Reviewer:

Method: PCBs (EPA 8082A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	%RSD ≤ 20 ICV ≤ 20
III	Continuing Calibration	A	CCV ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	ND	EB = EB-GW-250501
VI	Surrogate Spikes	A	
VII	Matrix Spike/Matrix Spike Duplicate	N	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	ND	D = 1, DUP-01
X	Target Analyte Quantitation	A	ND, Result < RL > MDL
XI	Target Analyte Identification	A	
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2062009-1		

LDC #: 61230A

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: ✓ GC __ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?	✓			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VI. Surrogate spikes	✓			
Were all surrogate percent recovery (%R) within the QC limits?				
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?		✓		
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GC __X_____ HPLC _____

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported 50ppb	Recalculated 50ppb	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/8/2025	AR1260-1 CLP1	0.066	0.066	0.065	0.065	5.28	5.28
	PEST2								
			AR1260-1 CLP2	0.074	0.074	0.078	0.078	11.30	11.30

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

#	Standard ID	Calibration Date	Compound	CCV Conc	Reported Conc	Recalculated Conc	Reported %R/%D	Recalculated %R/%D
1	CCV PEST 2	5/5/25 0605	1260-1	0.065	0.071	0.071	9.2	9.2
			ch A	0.060	0.047	0.047	21.7	21.7
			B					
2								
3	ECV PEST 23	5/4/25 0908	↓	0.055	0.06	0.06	9.1	9.1
				0.050	0.06	0.06	3.4	3.4
4								
5								
6								
7								
8								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC ✓ HPLC ____

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: #1

		Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
TCMX	cap1	50.0	40.096	80	80	0
↓	2	↓	40.908	82	82	↓
DCB	cap1		39.934	80	80	
↓	2		40.004	80	80	

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DC	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic aci	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. Ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC # 612304

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC ✓ HPLC_____

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG206200 9-2/3

Compound	SA (ng/L)		SSC (ng/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Aroclor 1260	2.5	2.5	1.94	2.02	78	78	81	81	4	4

LDC #: 61230Δ

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC ✓ HPLC _____

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

WG206200 9-2 (LCS) Aroclor 1260

Final Conc = Conc *Vp*DF / VS

Where:
Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

PEST 23

Concentration = $\frac{(194.397)(1.0)}{(100)}$

= 1.94 ug/L

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	Aroclor 1260	1.94	1.94	0
	1260-1 = $\frac{(740.0 \times 10^6)(25.0)}{(1934.7 \times 10^6)(0.055)}$		1260-1 =	173.678
			2 =	164.521
			3 =	207.985
		= 173.678	4 =	216.632
			5 =	209.171
			Ave =	194.397

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer: FM
2nd Reviewer:

Method: Herbicides (EPA 8151A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration/ ICV	A/A	%RSD ≤ 20 ICV ≤ 20
III	Continuing Calibration	A	CCV ≤ 20
IV	Laboratory Blanks	A	
V	Field Blank	ND	EB = EB-GW-250501
VI	Surrogate Spikes 1/4	A	
VII	Matrix Spike/Matrix Spike Duplicate	N	CS
VIII	Laboratory Control Sample	A	LCS/D
IX	Field Duplicate	ND	D = 1, DUP-01
X	Target Analyte Quantitation	A	NO Result < RL > MDL
XI	Target Analyte Identification	A	1
XII	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

2,4-D, 2,4,5-T, 2,4,5-TP (Silvex)

Notes:

WG2061581		

Method: ✓GC __HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?	✓			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?		✓		
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?			✓	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: ___GC___HPLC

8310	8330	8151/8321	8141		8021B
A. Acenaphthene	A. HMX	A. 2,4-D	A. Dichlorvos	CC. Trichlorinate	V. Benzene
B. Acenaphthylene	B. RDX	B. 2,4-DB	B. Mevinphos	DD. Trifluralin	CC. Toluene
C. Anthracene	C. 1,3,5-Trinitrobenzene	C. 2,4,5-T	C. Demeton-O	EE. Def	EE. Ethyl Benzene
D. Benzo(a)anthracene	D. 1,3-Dinitrobenzene	D. 2,4,5-TP	D. Demeton-S	FF. Prowl	SSS. O-Xylene
E. Benzo(a)pyrene	E. Tetryl	E. Dinoseb	E. Ethoprop	GG. Ethion	RRR. MP-Xylene
F. Benzo(b)fluoranthene	F. Nitrobenzene	F. Dichlorprop	F. Naled	HH. Famphur	GG. Total Xylene
G. Benzo(g,h,i)perylene	G. 2.4.6-Trinitrotoluene	G. Dicamba	G. Sulfotep	II. Phosmet	
H. Benzo(k)fluoranthene	H. 4-Amino-2,6-dinitrotoluene	H. Dalapon	H. Phorate	JJ. Tetrachlorvinphos	
I. Chrysene	I. 2-Amino-4,6-dinitrotoluene	I. MCPP	I. Dimethoate	KK. Demeton (total)	
J. Dibenz(a,h)anthracene	J. 2,4-Dinitrotoluene	J. MCPA	J. Diazinon		
K. Fluoranthene	K. 2,6-Dinitrotoluene	K. Pentachlorophenol	K. Disulfoton		
L. Fluorene	L. 2-Nitrotoluene	L. 2,4,5-TP (silvex)	L. Parathion-methyl	**8315A**	
M. Indeno(1,2,3-cd)pyrene	M. 3-Nitrotoluene	M. Silvex	M. Ronnel	A. Formaldehyde	
N. Naphthalene	N. 4-Nitrotoluene	N. 2,4-Dichlorophenoxybutyric acid	N. Malathion	B. Acetaldehyde	
O. Phenanthrene	O. Nitroglycerin	O. 3,5-Dichlorobenzoic acid	O. Chlorpyrifos	C. Benzaldehyde	
P. Pyrene	P. Picric acid	P. Bentazon	P. Fenthion	D. Butyraldehyde	
Q.	Q. 2,4-Dinitrophenol	Q. Picloram	Q. Parathion-ethyl	C. Benzaldehyde	
R.	R. 3,5-Dinitroaniline		R. Trichlornate	D. Butyraldehyde	
S.	S. 2-Nitrophenol		S. Merphos		
	T. 4-Nitrophenol		T. Stirofos		
	U. Picramic acid		U. Tokuthion	**Organic acids**	
	V. PETN		V. Fensulfothion	A. Acetic acid	
	W. Hexahydro-1,3,5-trinitroso-1,3,5-triazine		W. Bolstar	B. Butyric acid	
	X. MNX		X. EPN	C. Lactic acid	
	Y. Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine		Y. Azinphos-methyl	D. Propionic acid	
	Z. DNX		Z. Coumaphos	E. Pyruvic acid	
	AA. TNX		AA. Parathion		
			BB. Trichloronate		

LDC #:61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT___

METHOD: GC __X_____ HPLC _____

The calibration factors (CF), average CF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where:
A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported 0.188mg/L	Recalculated 0.188mgf/L	Reported Average CF (Initial)	Recalculated Average CF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	4/15/2025	2,4-D ChA	0.225	0.225	0.220	0.220	8.97	8.97
	PEST 15								
			2,4-D ChB	0.236	0.236	0.235	0.235	7.42	7.42

LDC # 61230Δ

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

#	Standard ID	Calibration Date	Compound	CCV Conc	Reported Conc	Recalculated Conc	Reported %R/%D	Recalculated %R/%D
1	CCV	5/4/25 13:20	2,4-D chΔ	0.22	0.244	0.244	10.91	10.9
			chB	0.235	0.232	0.232	1.3	1.3
2								
3								
4								
5								
6								
7								
8								

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

METHOD: GC__✓__HPLC_____

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

%Recovery: SURRF/SURRS * 100

Where: SURRF = Surrogate Found
SURRS = Surrogate Spiked

Sample ID: 11

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
DCAA CLP1	0.50	0.416	83	83	0
↓ CLP2	↓	0.391	78	78	↓

Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound	Surrogate Compound
A. Chlorobenzene (CBZ)	I Fluorobenzene (FBZ)	Q Dichlorophenyl Acetic Acid (DC	Y Tetrachloro-m- xylene	GG 2-Nitro-m-xylene	OO.
B. 4-Bromofluorobenzene (BFB)	J n-Triacontane	R 4-Nitrophenol	Z 2-Bromonaphthalene	HH p-Terphenyl	PP
C. a,a,a-Trifluorotoluene	K Hexacosane	S 1-Chloro-3-Nitrobenzene	AA 1-Chlorooctadecane	II Tripropylphosphate	QQ.
D. Bromochlorobenzene	L Bromobenzene	T 3,4-Dinitrotoluene	BB 2,4-Dichlorophenylacetic ac	JJ 2,3-Dibromopropionic acid	RR
E. 1,4-Dichlorobutane	M Benzo(e)Pyrene	U Tripentyltin	CC 2,5-Dibromotoluene	KK Pentachloroethane	SS
F. 1,4-Difluorobenzene (DFB)	N Terphenyl-D14	V Tri-n-propyltin	DD n-Nonatriacontane	LL 1,1,1,2-Tetrachloroethane	TT
G. Octacosane	O Decachlorobiphenyl (DCB)	W Tributyl Phosphate	EE 1,2-Dibromopropane	MM 5-alpha Androstane	UU
H. Ortho-Terphenyl	P 1-methylnaphthalene	X Triphenyl Phosphate	FF 1,2-Dinitrobenzene	NN 2-Fluorobiphenyl	VV

LDC # 61230A

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC_✓_HPLC_____

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added

LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS/LCSD ID: WG206158 1 . 2, 3

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
2,4-D	5	5	4.41	4.18	88	88	84	84	5	5.3

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GC ✓ HPLC _____

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = $\frac{\text{Conc} * Vp * DF}{VS}$

WG20615B1-2(LCS) 2,4-D

Concentration = $\frac{354.6 \times 10^6 (0.25)(10)(1000)}{914.3 \times 10^6 (0.220)(100U)}$

= 4.41 ug/L

Where:
- Ax = Area or height of the peak for the compound to be measured
- DF = Dilution factor
- CF = Calibration factor from continuing calibration curve
- Vs = Volume of sample extracted in milliters (mL)
- Vp = Purge Volume

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	2,4-D	4.41	4.41	0

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: PFAS (EPA 1633)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/Δ	
II	LC/MS Instrument Performance Check	Δ	
III	Initial Calibration/ ICV	A/Δ	%RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration/ISC/~~Bile Salt~~	Δ/Δ	CCV/ISC ≤ 30
V	Laboratory Blanks	Δ	
VI	Field Blank	SW	EB= EB-GW-250501
VII	Matrix spike/Matrix spike duplicates	N	CS
VIII	Laboratory Control Sample	SW	SW LCS, LLCS
IX	Field Duplicate	SW	D= 1, DUP-01
X	Internal standards	Δ	
XI	Target Analyte Quantitation	Δ	Results < RL > MDL = Jdet
XII	Target Analyte Identification	SW	
XIII	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

WG2062162-1		

LDC #: 61230A

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: [illegible]

Method: LC/MS PFAS (EPA Method 1633)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
III. Initial calibration and Initial Calibration Verification				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination (r^2) criteria of ≥ 0.990?			✓	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were the retention time windows properly established?	✓			
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) of the initial calibration verification ≤ 30%?	✓			
IV. Continuing calibration and Instrument Sensitivity Check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	✓			
Were all the retention times within the acceptance windows?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
Were the RTs for the bile salt peaks outside the RT window of PFOS by at least one minute?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 61230D

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: JT

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target analytes detected in the field duplicates?	✓			
X. Internal Standards				
Were extracted internal standard (EIS) percent recoveries (%R) between ~~20-150%~~ QC limit?	✓			
Were non-extracted internal standard (NIS) areas >30% of the average area of the calibration standards?	✓			
Were NIS retention times within 0.4 minutes of the initial calibration midPoint?	✓			
XI. Target analyte quantitation				
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound retention times within 0.1 minutes of the associated labeled compound for compounds with a labeled analog?	✓			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	✓			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
Were ion ratios between 50-150%?		✓		
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFAS

A. Perfluorobutanoic acid (PFBA)	X. NMeFOSA	UU. N-Ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
B. Perfluoropentanoic acid (PFPeA)	Y. NEtFOSA	VV. Hexafluoropropylene oxide dimer acid (HFPO-DA)
C. Perfluorohexanoic acid (PFHxA)	Z. NMeFOSAA	WW. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
D. Perfluoroheptanoic acid (PFHpA)	AA. NEtFOSAA	XX. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
E. Perfluorooctanoic acid (PFOA)	BB. NMeFOSE	YY. 1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)
F. Perfluorononanoic acid (PFNA)	CC. NEtFOSE	ZZ. 1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)
G. Perfluorodecanoic acid (PFDA)	DD. HFPO-DA (GenX)	A1. 1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)
H. Perfluoroundecanoic acid (PFUnA)	EE. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	B1. N-ethylperfluorooctane sulfonamide (NEtFOSA)
I. Perfluorododecanoic acid (PFDoA)	FF. Perfluoro-4-methoxybutanoic acid (PFMBA)	C1. N-methylperfluorooctane sulfonamide (NMeFOSA)
J. Perfluorotridecanoic acid (PFTrDA)	GG. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	D1. N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)
K. Perfluorotetradecanoic acid (PFTeDA)	HH. Perfluoro-3-methoxypropanoic acid (PFMPA)	E1. N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)
L. Perfluorobutanesulfonic acid (PFBS)	II. 9Cl-PF3ONS	F1. 3-Perfluoropropyl propanoic acid (3:3FTCA)
M. Perfluoropentanesulfonic acid (PFPeS)	JJ. 11Cl-PF3OUdS	G1. 3-Perfluoropentylpropanoic acid (5:3FTCA)
N. Perfluorohexanesulfonic acid (PFHxS)	KK. Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	H1. 3-Perfluoroheptyl propanoic acid (7:3FTCA)
O. Perfluoroheptanesulfonic acid (PFHpS)	LL. 3:3 FTCA	
P. Perfluorooctanesulfonic acid (PFOS)	MM. 5:3 FTCA	
Q. Perfluorononanesulfonic acid (PFNS)	NN. 7:3 FTCA	
R. Perfluorodecanesulfonic acid (PFDS)	OO. 3:3 Fluorotelomer carboxylate (3:3 FTCA)	
S. Perfluorododecanesulfonic acid (PFDoS)	PP. 5:3 Fluorotelomer carboxylate (5:3 FTCA)	
T. 4:2 FTS	QQ. 7:3 Fluorotelomer carboxylate (7:3 FTCA)	
U. 6:2 FTS	RR. Perfluorooctadecanoic acid (PFODA)	
V. 8:2 FTS	SS. Perfluorohexadecanoic acid (PFHxDA)	
W. Perfluorooctanesulfonamide (PFOSA)	TT. N-Methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

LDC #: 61230Δ

VALIDATION FINDINGS WORKSHEET
Field Blanks

EB = EB-GW-250501

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Sampling date: 5/01/25 **Associated samples:** All (ND)

Analyte	Blank ID (ng/L)	Sample Identification				
	EB					
B1	0.742					

LDC #: 61230△

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

#	LCS/LLCS ID	Analyte	LCS %R	LLCS %R	%R Limits	Associated Samples	Qualifications
	WG206216 2-2 LLCS	EE	165		65-145	All	Jdw 1p (NP)

Method: 1633

Analyte	Concentration (ng/L)		RPD
	1	DUP-01	
Perfluorobutanoic Acid (PFBA)	0.932	0.771	19
Perfluorobutanesulfonic Acid (PFBS)	0.516	0.632	20
Perfluorohexanoic Acid (PFHxA)	0.416	0.486	16
Perfluoroheptanoic Acid (PFHpA)	0.609	0.617	1
Perfluorohexanesulfonic Acid (PFHxS)	0.509	0.478	6
Perfluorooctanoic Acid (PFOA)	5.76	6.06	5
Perfluorooctanesulfonic Acid (PFOS)	4.16	4.24	2
Perfluoropentanoic Acid (PFPeA)	0.347U	0.370	NC

LDC#: 61230A

VALIDATION FINDINGS WORKSHEET
Target Analyte Identification

Reviewer: FT

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 1633)

Sample ID	Analyte	Ion Ratio outside limit: Ion Ratio (Limit)	Qualification
1	C	0.119 (0.033 – 0.099)	Jdet /P

LDC #:61230A

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: LCMS EPA Method 1633

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 2.32/2.5 std)	Recalculated (RRF 2.32/2.5 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL LCMS07	4/29/2025	PFOS	1.117	1.117	1.090	1.090	6.614	6.614
			PFOA	0.957	0.957	0.844	0.844	7.627	7.627

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

METHOD:
LC/MS/MSEPA Draft Method 1633
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF	Recalculated RRF	Reported %R	Recalculated %R
1	CCV	5/6/25	PFOA ($^{13}C_8$-PFOA)	5.00	4.214	4.214	84.3	84.3
		1119	PFOS ($^{13}C_8$-PFOS)	4.640	3.805	3.805	82	82
2	CCV	5/6/25	PFOA ($^{13}C_8$-PFOA)	↓	4.415	4.415	88.3	88.3
		1411	PFOS ($^{13}C_8$-PFOS)		3.580	3.580	77.2	77.2
3			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
4			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					
5			PFOA ($^{13}C_8$-PFOA)					
			PFOS ($^{13}C_8$-PFOS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 62230A

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: _____

Method:
EPA Draft Method 1633
The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: WG206216 2 - 3

Compound	Spike Added (ng/L)		Spike Concentration (ng/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	20	NA	21.2	NA	106	106				
PFOS	18.6	↓	17.8	↓	96	96				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 61230A

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Method:
LC/MS/MS EPA Draft Method 1633

The concentration of the sample was calculated for the compound identified below using the following calculation:

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #1 , PFOA

Conc. = $\frac{(151712)(2.5)(4)}{(600618)(0.844)(519.02)}$

= 5.76 ng/L

#	Sample ID	Analyte	Reported Concentration (ng/L)	Calculated Concentration (ng/L)	Qualification
	#1	PFOA	5.76	5.76	-

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, LLC, Westborough, MA
SDG:	L2527011
Reviewer:	Nicholas Fetter and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	July 10, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
RMW-03-250501	L2527011-01	Metals, Wet Chemistry
RMW-03-250501MS	L2527011-01MS	Wet Chemistry
RMW-03-250501DUP	L2527011-01DUP	Wet Chemistry

Associated QC Samples(s):

Field/Trip Blanks:	EB-GW-250501
Field Duplicate pair:	RMW-03-250501 and DUP-01-250501

The above-listed water samples were collected on May 1, 2025 and were analyzed for metals by SW-846 methods 6020B and 7470A, cyanide by SW-846 methods 9010C/9012B, and hexavalent chromium by SW-846 method 7196A. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Inorganic Superfund Data Review,* EPA 542-R-20-006 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The inorganic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Instrument Calibration
- Blank Analysis Results
- Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Result
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Duplicate Results
- Laboratory Control Sample (LCS) Results
- Serial Dilution Results
- Field Duplicate Results
- Detection Limits Results
- Sample Quantitation Results

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

Initial and Continuing Calibration

All criteria were met.

ICP Interference Check Sample Analysis

Metals

All criteria were met.

Blanks

Metals

Analytes were detected below the reporting limits in the laboratory blank samples. The following table summarizes the contamination and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
ICB/CCB	Beryllium	0.228 ug/L	0.00114 mg/L	RMW-03-250501
	Thallium	0.498 ug/L	0.00249 mg/L	

Blank Actions for analytes detected below the reporting limit (RL).
If the sample result is < RL, report the result as nondetect (U) at the RL.
If the sample result is > RL or nondetect, no action is required.
Blank Actions for analytes detected above the reporting limit or RL.
If the sample result is < RL and <action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

No samples were qualified since the associated sample results were greater than the action level or nondetect.

Contamination was detected in the equipment blank sample EB-GW-250501 for the metals analyses. The following table summarizes the contamination greater than the reporting limit and validation actions taken.

Blank ID	Analyte	Level Detected	Action Level	Associated Samples
EB-GW-250501	Potassium	0.0373 mg/L	0.1865 mg/L	RMW-03-250501
	Sodium	0.0644 mg/L	0.322 mg/L	
	Zinc	0.00372 mg/L	0.0186 mg/L	
	Mercury	0.00010 mg/L	0.0005 mg/L	

Blank Actions for analytes detected above the reporting limit (RL).
If the sample result is < RL and < action level; report the result as nondetect (U) at the RL.
If the sample result is > RL and < action level; report the result as nondetect (U) at the reported value.
If the sample result is > action level or nondetect, no action is required.

Qualified sample results are listed in the table below.

Sample	Analyte	Reported Level	Validation Action
RMW-03-250501	Zinc	0.00766	0.01000U
	Mercury	0.00047	0.00047J

These results can be used for project objectives as nondetect (U) or estimated (J) values which may have a minor impact on the data usability.

Wet Chemistry

Contamination was not detected in the method blanks.

No positive results were found in the equipment blank sample EB-GW-250501 for wet chemistry analyses.

MS/MSD Results

Metals

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Wet Chemistry

All criteria were met.

Laboratory Duplicate Results

Metals

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

Wet Chemistry

All criteria were met.

Serial Dilution

Metals

Serial dilution was not performed for this SDG.

LCS Results

All criteria were met.

Field Duplicate Results

Samples RMW-03-250501 and DUP-01-250501 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Metals

Analyte	Concentration (mg/L)		RPD
	RMW-03-250501	DUP-01-250501	
Aluminum	2.26	2.01	12
Arsenic	0.00053	0.00046	14
Barium	0.04915	0.04802	2
Cadmium	0.00006	0.00007	15
Calcium	5.94	5.83	2
Chromium	0.00509	0.00472	8
Cobalt	0.00173	0.00153	12
Copper	0.00615	0.00547	12
Iron	3.60	3.32	8
Lead	0.00118	0.00111	6
Magnesium	2.92	2.76	6
Manganese	0.1660	0.1558	6
Mercury	0.00047	0.00027	54
Nickel	0.00551	0.00516	7
Potassium	1.95	1.83	6
Sodium	3.60	3.57	1
Vanadium	0.00461	0.00426	8
Zinc	0.00766	0.00713	7

Wet Chemistry

No results were detected in any of the samples.

Detection Limits Results

Results were reported which were below the reporting limit (RL) and above the method detection limit (MDL) in the metals analyses. These results were qualified as estimated (J) by the laboratory.

No results were reported below the RL and above the MDL in the wet chemistry analyses.

Dilutions were not required for metals and wet chemistry analyses.

Sample Quantitation Results

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1/1
Reviewer: NF
2nd Reviewer:

Method: Metals (EPA 6020B); Mercury (EPA 7470A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	ICP/MS Tune	A	
III	Initial Calibration	A	
IV	ICV/Continuing Calibration	A	
V	ICP Interference Check Sample Analysis	A	
VI	Laboratory Blanks	SW	
VII	Field Blank	SW	EB=EB-GW-250501
VIII	Matrix Spike/Matrix Spike Duplicate	N	
IX	Laboratory Duplicate	N	
X	Serial Dilution	N	
XI	Laboratory Control Sample	A	LCS
XII	Field Duplicate	SW	FD=(1, DUP-01-250501)
XIII	Internal Standards (ICP-MS)	A	
XIV	Target Analyte Quantitation	A	MDL<sample<RL, no dil'n.
XV	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = Not detected; NQ = Not qualified; FD = Field duplicate; FT = Field triplicate; TB = Trip blank; FB = Field blank; AB= Ambient blank; SB = Source blank; EB = Equipment blank; R = Rinsate

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Matrix	Method	Target Analyte List
1	w	6020B	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn
		7470A	Hg

Comments:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Findings/Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
Were all water samples preserved to a pH of <2.	YES			
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?	YES			
Were %RSDs of isoptoes in the tuning solution ≤5%?	YES			
III./IV. Calibration				
Were all instruments calibrated daily?	YES			
Were the proper standards used?	YES			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	YES			
Were the low level standard checks within 70-130%?			NA	
Were all initial calibration correlation coefficients within limits as specifed by the method?	YES			
V. Interference Check Sample				
Were the interference check samples performed daily?	YES			
Were the AB solution recoveries within 80-120%?	YES			
VI. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?	YES			
VII. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?	YES			
VIII./IX. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)			NA	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			NA	
X. Serial Dilution				
Were all percent differences <10%?			NA	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			NA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Findings/Comments**
XI. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?	YES			
XIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-120% for EPA Method 200.8) QC limits?	YES			
If the recoveries were outside the limits, was a reanalysis performed?			NA	
XIV. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?			NA	
XV. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/L Associated Samples: All

				Sample Identification				
Analyte	**PB (units)**	**Maximum ICB/CCB (ug/L)**	**Action Level (mg/L)**					
Beryllium		0.228	0.00114					
Thallium		0.498	0.00249					

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Blank units: mg/L
Sampling Date: 05/01/25

Associated sample units: mg/L
Associated Samples: All

			Sample Identification					
Analyte	Blank ID	Action Level	1					
	EB-GW-250501							
Potassium	0.0373	0.1865						
Sodium	0.0644	0.322						
Zinc	0.00372	0.0186	0.00766/0.01000U					
Mercury	0.00010	0.0005	0.00047J					

Comments: The action level, when applicable, is establised at 5X the highest concentration.
V:\Nick\Validation Worksheets\Terraphase\Elmwood Preserve\LDC 61230A_metals

Field Duplicates

Method: Metals

Analyte	Concentration (mg/L)		RPD
	1	DUP-01-250501	
Aluminum	2.26	2.01	12
Arsenic	0.00053	0.00046	14
Barium	0.04915	0.04802	2
Cadmium	0.00006	0.00007	15
Calcium	5.94	5.83	2
Chromium	0.00509	0.00472	8
Cobalt	0.00173	0.00153	12
Copper	0.00615	0.00547	12
Iron	3.60	3.32	8
Lead	0.00118	0.00111	6
Magnesium	2.92	2.76	6
Manganese	0.1660	0.1558	6
Mercury	0.00047	0.00027	54
Nickel	0.00551	0.00516	7
Potassium	1.95	1.83	6
Sodium	3.60	3.57	1
Vanadium	0.00461	0.00426	8
Zinc	0.00766	0.00713	7

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

An intial calibration verification (ICV), continuing calibration verification (CCV), low level calibration check (LLCC), and interference check sample (ICSAB) percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis

True = concentration of each analyte in the source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalcuated %R	Reported %R	Acceptable (Y/N)
ICV	ICP						
CCV	ICP						
LLCC	ICP						
ICSAB	ICP						
ICV	ICP-MS	Ba	54.8	50.0	109.6	110	Y
CCV	ICP-MS	Cr	60.9	60.0	101.5	102	Y
LLCC	ICP-MS						
ICSAB	ICP-MS	Fe	238000	250000	95.2	95	Y
ICV	CVAA (mg/L)	Hg	0.0030	0.00300	100	99	Y
CCV	CVAA (mg/L)	Hg	0.0049	0.00500	98	99	Y

ICP-MS Tune	QC Parameter	Mass	Actual	Required
05/11/25	Mass Axis	59	58.9	± 0.1 amu
05/11/25	%RSD	7	0.8	≤ 5%

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Percent recoveries (%R) for the laboratory control sample (LCS), matrix spike (MS), and post digestion spike (PDS) were recalculated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

The serial dilution percent difference (%D) was recalculated using the following formula.

%D = (Absolute value (I - SDR)) x 100 / (I)

I = Initial sample result

SDR = Serial dilution result (with a 5x dilution applied)

Sample ID	Type of Analysis	Element	Found/S/I	True/D/SDR	Recalcuated %R/RPD/%D	Reported %R/RPD/%D	Acceptable (Y/N)
WG2063225 LCS	LCS	Cu	0.267	0.25	106.8	107	Y
	MS						
	Duplicate						
	PDS						
	Serial dilution						

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: NF

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Analytes were recalculated and verified using the following equation:
Concentration = (Result from raw data x Final volume x Dilution factor) / (Initial volume)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Volume (mL)	Final Volume (mL)	Reported Result (mg/L)	Recalcuated Result (mg/L)	Acceptable (Y/N)
1	Fe	3601.279	1	50	50	3.60	3.601279	Y

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230A
SDG #: L2527011
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1/1
Reviewer: NF
2nd Reviewer: A

Method: Cyanide (EPA 9010C/9012B); Hexavalent Chromium (EPA 7196A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	Initial Calibration	A	
III	ICV/Continuing Calibration	A	
IV	Laboratory Blanks	A	
V	Field Blank	ND	EB=EB-GW-250501
VI	Matrix Spike/Matrix Spike Duplicate	A	
VII	Laboratory Duplicate	A	
VIII	Laboratory Control Sample	A	LCS/LCSD
IX	Field Duplicate	ND	FD=(1, DUP-01-250501)
X	Target Analyte Quantitation	A	MDL < no sample < RL, no dln.
XI	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	RMW-03-250501	L2527011-01		Water	05/01/2025	Category B
2	RMW-03-250501MS	L2527011-01MS	MS	Water	05/01/2025	Category B
3	RMW-03-250501DUP	L2527011-01DUP	DUP	Water	05/01/2025	Category B

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	CN-, Cr(VI)
QC	
2-3	Cr(VI)

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Findings/Comments**
I. Technical holding times				
Were all technical holding times met?	YES			
II./III. Calibration				
Were all instruments calibrated at the required frequency?	YES			
Were the proper number of standards used?	YES			
Were all initial and continuing calibration verifications within the QC limits?	YES			
Were all initial calibration correlation coefficients within	YES			
Were balance checks performed as required?	YES			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	YES			
Was there contamination in the method blanks?		NO		
Was there contamination in the initial and continuing calibration blanks?		NO		
V. Field Blanks				
Were field blanks identified in this SDG?	YES			
Were target analytes detected in the field blanks?		NO		
VI./VII. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	YES			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	YES			
VIII. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	YES			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	YES			
IX. Field Duplicates				
Were field duplicates identifed in this SDG?	YES			
Were target analytes detected in the field duplicates?		NO		
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	YES			
Were all soil samples dry weight corrected?			NA	
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	YES			

METHOD: Inorganics

The correlation coefficient (r) for the calibration of CN- were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	CN-	s1	0	-0.00191	0.999980	0.99997	Y
		s2	0.2	0.00887			
		s3	0.5	0.01985			
		s4	1	0.03806			
		s5	2	0.07967			
		s6	5	0.1957			
		s7	10	0.39111			
		s8	25	0.96561			

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated %R	Reported %R	Acceptable (Y/N)
Calibration verification	CN-	0.09792	0.1		97.92	98	Y
Calibration verification	CN-	5.51222	5		110.2444	110	Y
Calibration verification	Cr(VI)	0.200	0.200		100	100	Y

VALIDATION FINDINGS CHECKLIST

Quality Control Sample Recalculations

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:

%R = (Found/True) x 100

Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)

True = concentration of each analyte in the source

The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = (Absolute value(S-D)x 200) / (S+D)

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
WG2063198 LCS	LCS	CN-	0.093	0.100	93	94	Y
2	MS	Cr(VI)	0.102	0.1	102	102	Y
WG2063198 LCSD	Duplicate	CN-	90.000	94	4.347826087	4	Y

* RPD calculated using %R

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (mg/L)	Dilution	Initial Volume (mL)	Final Volume (mL)	Reported Result (mg/L)	Recalculated Result (mg/L)	Acceptable (Y/N)
1	CN-	0.00157	1	50	50	0.005U	0.00157	Y
1	Cr(VI)	0.001	1	50	50	0.010U	0.001	Y

Site:	Elmwood Preserve
Laboratory:	Pace Analytical Services, LLC, Westborough, MA
SDG:	L2534650
Reviewer:	Felomina Tanguilig and Pei Geng/Laboratory Data Consultants for Terraphase Engineering Inc. - Portsmouth, NJ
Date:	July 11, 2025

Samples Reviewed and Evaluation Summary

FIELD ID	LAB ID	FRACTIONS VALIDATED
MW-11D-250430-UF	L2534650-01	1,4-Dioxane

Associated QC Samples(s):

Field/Trip Blanks: None Associated
Field Duplicate pair: None Associated

The above-listed water sample was collected on April 30, 2025 and was analyzed for 1,4-dioxane by SW-846 method 8270E in Selected Ion Monitoring (SIM) mode. The data validation was performed in accordance with the Quality Assurance Project Plan, Elmwood Preserve (January 2025) and the USEPA *National Functional Guidelines for Organic Superfund Methods Data Review,* EPA 540-R-20-005 (November 2020), modified as necessary to accommodate the non-CLP methodologies used.

The organic data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness
- Holding Times and Sample Preservation
- Gas Chromatography/Mass Spectrometry (GC/MS) Tunes
- Initial and Continuing Calibrations
- Blank Analysis Results
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Laboratory Control Sample (LCS) Results
- Internal Standards
- Field Duplicate Results
- Quantitation Limits and Data Assessment
- Sample Quantitation and Target Analyte Identification

Overall Evaluation of Data and Potential Usability Issues

All results are usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

The validation findings were based on the following information.

Data Completeness

The data package was complete as defined under the requirements for the NYSDEC ASP category B laboratory deliverables.

Holding Times and Sample Preservation

All criteria were met.

GC/MS Tunes

All criteria were met.

Initial and Continuing Calibrations

All criteria were met.

Blanks

Contamination was not detected in the method blanks.

A field blank was not associated with this sample set. Validation action was not required on this basis.

Surrogate Recoveries

All criteria were met.

MS/MSD Results

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

LCS Results

All criteria were met.

Internal Standards

All criteria were met.

Field Duplicate Results

No field duplicates were identified in this SDG.

Quantitation Limits and Data Assessment

No results were reported below the RL and above the MDL in the 1,4-dioxane analysis.

Dilutions were not required for 1,4-dioxane analysis.

Sample Quantitation and Target Analyte Identification

Calculations were spot-checked; no discrepancies were noted.

DATA VALIDATION QUALIFIERS

U - The analyte was analyzed for, but due to blank contamination was flagged as nondetect (U). The result is usable as a nondetect.

J - Data are flagged (J) when a QC analysis fails outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result, even though several associated QC analyses may fail. The 'J' data may be biased high or low or the direction of the bias may be indeterminable.

UJ - The analyte was not detected above the reported sample quantitation limit. Data are flagged (UJ) when a QC analysis fails outside the primary acceptance limits. The qualified "UJ" data are not excluded from further review or consideration. However, only one flag is applied to a sample result, even though several associated QC analyses may fail. The 'UJ' data may be biased low.

JN - The analysis indicates the presence of an analyte that has been "tentatively identified" (N) and the associated numerical value represents its approximate (J) concentration.

R - Data rejected (R) on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user must not use the rejected data to make environmental decisions. The presence or absence of the analyte cannot be verified.

VALIDATION COMPLETENESS WORKSHEET

LDC #: 61230B
SDG #: L2534650
Laboratory: Pace Analytical Services, LLC, Westborough, MA

Date: 6/24/2025
Page: 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: 1,4-Dioxane (EPA 8270E SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I	Sample Receipt/Technical Holding Time	A/A	
II	GC/MS Instrument Performance Check	A	
III	Initial Calibration/ ICV	A/A	%RSD ≤ 20 ICV ≤ 30
IV	Continuing Calibration	A	CCV ≤ 20
V	Laboratory Blanks	A	
VI	Field Blank	N	
VII	Surrogate Spikes	A	
VIII	Matrix Spike/Matrix Spike Duplicate	N	[illegible]
IX	Laboratory Control Sample	A	LCS ID
X	Field Duplicate	N	
XI	Internal standards	A	
XII	Target Analyte Quantitation	A	NJ Result < RL > MDL
XIII	Target Analyte Identification	A	
XIV	Overall Assessment of Data	A	

Note: A = Acceptable; ND = Not detected; FT = Field triplicate; AB= Ambient blank; R = Rinsate
N = Not provided/applicable; NQ = Not qualified; TB = Trip blank; SB = Source blank
SW = See worksheet; FD = Field duplicate; FB = Field blank; EB = Equipment blank

	Client ID	Lab ID	QC Type	Matrix	Date	Stage
1	MW-11D-250430-UF	L2534650-01		Water	04/30/2025	Category B

Notes:

WG2078112 - 1Blank		

LDC #: 61230B

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% (15/30% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			✓	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?			✓	
Did the laboratory provide before and after integration printouts?			✓	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET ANALYTE LIST

METHOD: GC/MS SVOC

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2.
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2.
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 61230B

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of Compound
C_x = Concentration of compound
S= Standard deviation of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF 50U std)	Recalculated RRF (RRF 50U std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL BNA11	5/2/25	1,4 - Dioxane	1.314	1.314	1.342	1.342	3.46	3.46

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (RRF std)	Recalculated RRF (RRF std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL								

LDC # 61230B

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal stanc
Cis = Concentration of internal standa

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1	ccv	5/15/15 1114	1,4-Dioxane	1.342	1.418	1.418	5.7	5.7

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial)	Reported RRF (CCV)	Recalculated RRF (CCV)	Reported % D	Recalculated %D
1								

LDC # 61230B

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) of surrogate compounds were recalculated for the compounds identified below using the following calculation:

Surrogate Found = (Area surr) (Conc IS) / (Area IS) (average RRF surr)
%Recovery: Surrogate Found/Surrogate Spiked * 100

Sample: #1

Surrogate	Surrogate Spiked (ng/ml)	Surrogate Found (ng/ml)	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
1,4-Dioxane d8	500	235.916	47	47	0

LDC # 61230B

VALIDATION FINDINGS WORKSHEET
LCS Results Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270 E)

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)
%Recovery = 100 * SSC/SA

Where:
SSC = Spiked concentration
SA = Spike added
LCS = Laboratory control spike recovery
LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS ID: WG207812 - 2/3

Compound	SA (ug/L)		SSC (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol										
Pyrene										
1,4-Dioxane	5.0	5.0	5.90	5.95	118	118	119	119	1	1

LDC #: 61230B

VALIDATION FINDINGS WORKSHEET
Sample Results Verification

METHOD: GCMS 8270

Results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

Final Conc = Conc *Vp*DF / VS

WG2078112-2 (LCS) 1,4-Dioxane

Concentration = $\frac{(12463)(500.0)(10)(1)}{(7869)(1.342)(1000)}$

$= 5.90$ ug/L

Where:
Ax = Area or height of the peak for the compound to be measured
DF = Dilution factor
CF = Calibration factor from continuing calibration curve
Vs = Volume of sample extracted in milliters (mL)
Vp = Purge Volume

BWA 1/1

Sample #	Analyte	Calculated Concentration (ug/L)	Reported Concentration (ug/L)	% Diff
LCS	1,4-Dioxane	5.90	5.90	0