LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

Technical Memorandum

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To: Monika Boguszewski, Langan Senior Staff Scientist

From: Emily Strake, Langan Senior Project Chemist/Risk Assessor

Date: March 31, 2016

Re: Data Usability Summary Report
For 450 Union Street
Soil Samples Collected February 2016
Langan Project No.: 170301202

This memorandum presents the findings of an analytical data validation of the data generated from the analysis of soil samples collected in February 2016 by Langan Engineering and Environmental Services ("Langan") at the 450 Union Street site ("the Site"). The samples were analyzed by Alpha Analytical (NYSDOH ELAP registration # 11148) for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, metals, mercury (Hg), cyanide (CN-), hexavalent chromium (Cr6+), and percent solids (%S).

- VOCs by SW-846 Method 8260C
- SVOCs SW-846 Method 8270D
- PCBs by SW-846 Method 8082A
- Pesticides by SW-846 Method 8081B
- Metals by SW-846 Methods 6010C and 6020A
- Mercury by SW-846 Methods 7470A and 7471B
- Cyanide by SW-846 Method 9010C/9012B
- Hexavalent chromium by SW-846 Method 7196A
- Percent solids by Method SM 2540G

Table 1, below, summarizes the laboratory and client sample identification numbers, sample collection dates, and analytical parameters subject to review.

Table 1: Sample Summary

SDG	***Lab Sample ID***	***Client Sample ID***	***Sample Date***	***Analytical Parameters***
L1603930	L1603930-16	SB10_0.5-2.5	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S

SDG	*Lab Sample ID*	*Client Sample ID*	*Sample Date*	*Analytical Parameters*
L1603930	L1603930-17	SB10_6-8	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-18	SB10_11-12	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-13	SB11_0.5-2.5	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-14	SB11_7-8	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-15	SB11_11-12	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-03	SB12_2-4	2/16/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-04	SB12_6-8	2/16/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-05	SB12_13-15	2/16/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-06	SB13_2-4	2/16/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-09	SB13R_5-7	2/17/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-10	SB13R_9-11	2/17/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-11	SB13R_15-16	2/17/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-04	SB14_1-3	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-05	SB14_9-11	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-06	SB14_13-14	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-010	SB15_1-3	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-11	SB15_7-8	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-12	SB15_14-16	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-07	SB16_1-3	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-08	SB16_9-11	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S

SDG	Lab Sample ID	Client Sample ID	Sample Date	Analytical Parameters
L1603930	L1603930-09	SB16-14-15	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-01	SB17_0.5-2.5	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-02	SB17_11.5-12.5	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-03	SB17_13-14	2/11/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-01	SB18_27-29	2/15/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-12	SB19_27-29	2/17/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-13	SB19_33-34	2/17/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-40	SB2R_FILL (6-8)	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-07	DUP2_021516	2/15/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1604257	L1604257-08	DUP2_021616	2/16/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-19	DUP1_021216	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+, %S
L1603930	L1603930-41	DELDUP-1_021216(4-6)	2/12/16	Total Lead, TCLP Lead
L1604257	L1604257-14	FB_021716	2/17/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+
L1604257	L1604257-15	TB_021716	2/17/16	VOCs
L1603930	L1603930-36	SB2R_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-37	SB2R_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-38	SB2R_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-39	SB2R_6-8	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-42	SB2N1_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-43	SB2N1_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-44	SB1N1_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-45	SB1N1_6-8	2/12/16	Total Lead, TCLP Lead
L1604257	L1604257-02	SB2N2_0.5-2	2/16/16	Total Lead, TCLP Lead
L1603930	L1603930-46	SB2E1_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-47	SB2E1_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-48	SB2E1_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-49	SB2E1_6-8	2/12/16	Total Lead, TCLP Lead

SDG	Lab Sample ID	Client Sample ID	Sample Date	Analytical Parameters
L1603930	L1603930-50	SB2E2_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-51	SB2E2_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-52	SB2E2_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-53	SB2E2_6-8	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-28	SB2S1_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-29	SB2S1_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-30	SB2S1_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-31	SB2S1_6-8	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-32	SB2S2_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-33	SB2S2_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-34	SB2S2_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-35	SB2S2_6-8	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-20	SB2W1_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-21	SB2W1_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-22	SB2W1_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-23	SB2W1_6-8	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-24	SB2W2_0.5-2	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-25	SB2W2_2-4	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-26	SB2W2_4-6	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-27	SB2W2_6-8	2/12/16	Total Lead, TCLP Lead
L1603930	L1603930-54	FB_021216	2/12/16	VOCs, SVOCs, PCBs, Pest, Metals, Hg, CN-, Cr6+
L1603930	L1603930-55	TB_021216	2/12/16	VOCs

Validation Overview

This data validation was performed in accordance with USEPA Region II Standard Operating Procedure (SOP) #HW-34, "Trace Volatile Data Validation" (February 2013, Revision 3), USEPA Region II SOP #HW-35, "Semivolatile Data Validation" (March 2013, Revision 2), USEPA Region II SOP #HW-36, "Pesticide Data Validation" (May 2013, Revision 4), USEPA Region II SOP #HW-37, "PCB Aroclor Data Validation" (May 2013, Revision 3), USEPA Region II SOP #HW-2a, "ICP-AES Data Validation" (December 2012, Revision 15), USEPA Region II SOP #HW2c, "Mercury and Cyanide Data Validation," the USEPA Contract Laboratory Program "National Functional Guidelines for Superfund Organic Methods Data Review" (USEPA-540R-08-01, June 2008), and the "National Functional Guidelines for Inorganic Superfund Data Review" (USEPA-540R-10-011, January 2010).

Validation includes review of the analytical data to verify that data are easily traceable and sufficiently complete to permit logical reconstruction by a qualified individual other than the originator. Items subject to review in this memorandum include holding times, sample preservation, sample extraction and digestion, instrument tuning, instrument calibration, laboratory blanks, laboratory control samples, system monitoring compounds, internal standard area counts, matrix spike/spike duplicate recoveries, target compound identification and quantification, chromatograms, overall system performance, serial dilutions, dual column performance, field duplicate, field blank and trip blank sample results.

As a result of the review process, the following qualifiers may be assigned to the data in accordance with the USEPA's guidelines and best professional judgment:

- **R –** The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
- **J –** The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ –** The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.
- **U –** The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.
- **NJ –** The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

If any validation qualifiers are assigned these qualifiers should supersede any laboratory-applied qualifiers. Data that is not qualified as a result of this data validation is considered acceptable on the basis of the items specified for review. Data that is qualified as "R" are not sufficiently valid and technically supportable to be used for data interpretation. Data that is otherwise qualified due to minor data quality anomalies are usable, as qualified.

Table 2: Validator-applied qualification

Client Sample ID	*Analysis*	*Analyte*	*CAS #*	*Validator Qualifier*
SB18_27-29	VOCs	Ethylbenzene	100-41-4	J
SB18_27-29	VOCs	m/p-Xylenes	179601-23-1	J

Client Sample ID	*Analysis*	*Analyte*	*CAS #*	*Validator Qualifier*
SB18_27-29	VOCs	Naphthalene	91-20-3	J
SB18_27-29	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB18_27-29	VOCs	p-Ethyltoluene	622-96-8	J
SB18_27-29	SVOCs	Benzo(a)anthracene	56-55-3	J
SB18_27-29	SVOCs	Benzo(a)pyrene	50-32-8	J
SB18_27-29	SVOCs	Benzo(b)fluoranthene	205-99-2	J
SB18_27-29	SVOCs	Benzo(k)fluoranthene	207-08-9	J
SB18_27-29	SVOCs	Chrysene	218-01-9	J
SB18_27-29	SVOCs	Acenaphthylene	208-96-8	J
SB18_27-29	SVOCs	Anthracene	120-12-7	J
SB18_27-29	SVOCs	Benzo(g,h,i)perylene	191-24-2	J
SB18_27-29	SVOCs	Fluorene	86-73-7	J
SB18_27-29	SVOCs	Phenanthrene	85-01-8	J
SB18_27-29	SVOCs	Dibenzo(a,h)anthracene	53-70-3	J
SB18_27-29	SVOCs	Indeno(1,2,3-cd)pyrene	193-39-5	J
SB18_27-29	SVOCs	Pyrene	129-00-0	J
SB18_27-29	SVOCs	Biphenyl	92-52-4	J
SB18_27-29	SVOCs	Dibenzofuran	132-64-9	J
SB18_27-29	SVOCs	2-Methylnaphthalene	91-57-6	J
SB18_27-29	SVOCs	Naphthalene	91-20-3	J
SB18_27-29	Pesticides	Endrin	72-20-8	UJ
SB18_27-29	Pesticides	Endrin aldehyde	7421-93-4	UJ
SB18_27-29	Pesticides	Endrin ketone	53494-70-5	UJ
SB18_27-29	Pesticides	4,4'-DDT	50-29-3	J
SB12_2-4	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB12_2-4	SVOCs	Acenaphthene	83-32-9	J
SB12_2-4	SVOCs	Fluoranthene	206-44-0	J
SB12_2-4	SVOCs	Phenanthrene	85-01-8	J
SB12_2-4	SVOCs	Pyrene	129-00-0	J
SB12_6-8	Wet Chem	Cyanide	57-12-5	J
SB12_6-8	VOCs	Chlorobenzene	108-90-7	UJ
SB12_6-8	VOCs	1,3-Dichlorobenzene	541-73-1	UJ

Client Sample ID	*Analysis*	*Analyte*	*CAS #*	*Validator Qualifier*
SB12_6-8	VOCs	1,4-Dichlorobenzene	106-46-7	UJ
SB12_6-8	VOCs	1,2-Dichlorobenzene	95-50-1	UJ
SB12_6-8	VOCs	1,2,4-Trichlorobenzene	120-82-1	UJ
SB12_6-8	VOCs	1,2,3-Trichlorobenzene	87-61-6	UJ
SB12_13-15	VOCs	Acetone	67-64-1	J
SB12_13-15	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB13_2-4	VOCs	Acetone	67-64-1	J
SB13_2-4	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB13_2-4	Wet Chem	Cyanide	57-12-5	J
DUP2_021516	Pesticides	Endrin	72-20-8	J
DUP2_021516	Pesticides	Endrin aldehyde	7421-93-4	J
DUP2_021516	VOCs	Ethylbenzene	100-41-4	J
DUP2_021516	VOCs	m/p-Xylenes	179601-23-1	J
DUP2_021516	VOCs	Naphthalene	91-20-3	J
DUP2_021516	VOCs	Dichlorodifluoromethane	75-71-8	UJ
DUP2_021516	SVOCs	p-Ethyltoluene	622-96-8	J
DUP2_021516	SVOCs	Benzo(a)anthracene	56-55-3	J
DUP2_021516	SVOCs	Benzo(a)pyrene	50-32-8	J
DUP2_021516	SVOCs	Benzo(b)fluoranthene	205-99-2	J
DUP2_021516	SVOCs	Benzo(k)fluoranthene	207-08-9	J
DUP2_021516	SVOCs	Chrysene	218-01-9	J
DUP2_021516	SVOCs	Acenaphthylene	208-96-8	J
DUP2_021516	SVOCs	Anthracene	120-12-7	J
DUP2_021516	SVOCs	Benzo(g,h,i)perylene	191-24-2	J
DUP2_021516	SVOCs	Fluorene	86-73-7	J
DUP2_021516	SVOCs	Phenanthrene	85-01-8	J
DUP2_021516	SVOCs	Dibenzo(a,h)anthracene	53-70-3	J
DUP2_021516	SVOCs	Indeno(1,2,3-cd)pyrene	193-39-5	J
DUP2_021516	SVOCs	Pyrene	129-00-0	J
DUP2_021516	SVOCs	Biphenyl	92-52-4	J
DUP2_021516	SVOCs	Dibenzofuran	132-64-9	J
DUP2_021516	SVOCs	2-Methylnaphthalene	91-57-6	J

Client Sample ID	*Analysis*	*Analyte*	*CAS #*	*Validator Qualifier*
DUP2_021516	SVOCs	Naphthalene	91-20-3	J
DUP2_021516	Pesticides	Endrin	72-20-8	J
DUP2_021516	Pesticides	Endrin aldehyde	7421-93-4	J
DUP2_021516	Pesticides	Endrin ketone	53494-70-5	J
DUP2_021516	Pesticides	4,4'-DDT	50-29-3	J
DUP2_021616	VOCs	Dichlorodifluoromethane	75-71-8	UJ
DUP2_021616	SVOCs	Bis(2-ethylhexyl)phthalate	117-81-7	U (200)
DUP2_021616	Pesticides	Endrin ketone	53494-70-5	J
DUP2_021616	Pesticides	4,4'-DDT	50-29-3	J
DUP2_021616	Pesticides	Endosulfan II	33213-65-9	J
DUP2_021616	SVOCs	Acenaphthene	83-32-9	J
DUP2_021616	SVOCs	Fluoranthene	206-44-0	J
DUP2_021616	SVOCs	Phenanthrene	85-01-8	J
DUP2_021616	SVOCs	Pyrene	129-00-0	J
SB13R_5-7	VOCs	2-Hexanone	591-78-6	UJ
SB13R_5-7	SVOCs	Hexachlorocyclopentadiene	77-47-4	UJ
SB13R_5-7	Wet Chem	Cyanide	57-12-5	J
SB13R_9-11	VOCs	Acetone	67-64-1	J
SB13R_9-11	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB13R_9-11	SVOCs	Hexachlorocyclopentadiene	77-47-4	UJ
SB13R_9-11	Pesticides	Endrin ketone	53494-70-5	J
SB13R_9-11	Pesticides	Endosulfan sulfate	1031-07-8	J
SB13R_9-11	Pesticides	Endrin	72-20-8	J
SB13R_9-11	Pesticides	Endosulfan II	33213-65-9	J
SB13R_15-16	VOCs	Acetone	67-64-1	J
SB13R_15-16	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB13R_15-16	SVOCs	Hexachlorocyclopentadiene	77-47-4	UJ
SB19_27-29	VOCs	Chloromethane	74-87-3	J
SB19_27-29	SVOCs	Hexachlorocyclopentadiene	77-47-4	UJ
SB19_27-29	Pesticides	4,4'-DDD	72-54-8	J
SB19_27-29	Pesticides	Chlordane	57-74-9	J
SB19_33-34	VOCs	Dichlorodifluoromethane	75-71-8	UJ

Client Sample ID	*Analysis*	*Analyte*	*CAS #*	*Validator Qualifier*
SB19_33-34	SVOCs	Hexachlorocyclopentadiene	77-47-4	UJ
SB19_33-34	Pesticides	4,4'-DDT	50-29-3	J
SB19_33-34	Pesticides	Endosulfan sulfate	1031-07-8	J
FB_021716	VOCs	1,2,3-Trichlorobenzene	87-61-6	UJ
FB_021716	VOCs	1,2,4-Trichlorobenzene	120-82-1	UJ
FB_021716	SVOCs	Hexachlorocyclopentadiene	77-47-4	UJ
FB_021716	Metals	Antimony	7440-36-0	U (0.01)
FB_021716	Metals	Chromium	7440-47-3	U (0.001)
FB_021716	Metals	Nickel	7440-02-0	U (0.002)
FB_021716	Metals	Sodium	7440-23-5	U (0.5)
FB_021716	Wet Chem	Cyanide	57-12-5	J
TB_021716	VOCs	1,2,3-Trichlorobenzene	87-61-6	UJ
TB_021716	VOCs	1,2,4-Trichlorobenzene	120-82-1	UJ
SB17_0.5-2.5	VOCs	Acetone	67-64-1	J
SB17_0.5-2.5	VOCs	Chlorobenzene	108-90-7	UJ
SB17_0.5-2.5	VOCs	1,3-Dichlorobenzene	541-73-1	UJ
SB17_0.5-2.5	VOCs	1,4-Dichlorobenzene	106-46-7	UJ
SB17_0.5-2.5	VOCs	1,2-Dichlorobenzene	95-50-1	UJ
SB17_0.5-2.5	VOCs	1,2,4-Trichlorobenzene	120-82-1	UJ
SB17_0.5-2.5	VOCs	1,2,3-Trichlorobenzene	87-61-6	UJ
SB17_0.5-2.5	Wet Chem	Hexavalent Chromium	18540-29-9	J
SB17_11.5-12.5	VOCs	Acetone	67-64-1	J
SB17_11.5-12.5	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB17_13-14	VOCs	Acetone	67-64-1	J
SB17_13-14	Wet Chem	Hexavalent Chromium	18540-29-9	J
SB14_1-3	VOCs	Acetone	67-64-1	J
SB14_1-3	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB14_9-11	VOCs	4-Methyl-2-pentanone	108-10-1	UJ
SB14_9-11	VOCs	TBA	75-65-0	UJ
SB14_9-11	VOCs	Acrolein	107-02-8	UJ
SB14_9-11	VOCs	2-Hexanone	591-78-6	UJ
SB14_9-11	Pesticides	4,4'-DDE	72-55-9	J

Client Sample ID	*Analysis*	*Analyte*	*CAS #*	*Validator Qualifier*
SB14_9-11	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB14_13-14	VOCs	Acetone	67-64-1	J
SB14_13-14	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB16_1-3	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB16_1-3	VOCs	Acetone	67-64-1	J
SB16_9-11	VOCs	4-Methyl-2-pentanone	108-10-1	UJ
SB16_9-11	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB16_9-11	VOCs	2-Hexanone	591-78-6	UJ
SB16-14-15	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB15_1-3	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB15_7-8	VOCs	4-Methyl-2-pentanone	108-10-1	UJ
SB15_7-8	VOCs	TBA	75-65-0	UJ
SB15_7-8	VOCs	Acrolein	107-02-8	UJ
SB15_7-8	VOCs	2-Hexanone	591-78-6	UJ
SB15_7-8	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB15_14-16	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB11_0.5-2.5	Pesticides	4,4'-DDT	50-29-3	J
SB11_0.5-2.5	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB11_7-8	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB11_11-12	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB10_0.5-2.5	Pesticides	4,4'-DDT	50-29-3	J
SB10_0.5-2.5	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB10_6-8	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB10_6-8	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB10_11-12	Metals	Manganese	7439-96-5	J
SB10_11-12	Metals	Potassium	7440-09-7	J
SB10_11-12	Metals	Sodium	7440-23-5	J
SB10_11-12	Metals	Aluminum	7429-90-5	J
SB10_11-12	Metals	Arsenic	7440-38-2	J
SB10_11-12	Metals	Calcium	7440-70-2	J
SB10_11-12	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
SB10_11-12	Wet Chem	Cyanide	57-12-5	UJ

Client Sample ID	Analysis	Analyte	CAS #	Validator Qualifier
SB10_11-12	VOCs	Dichlorodifluoromethane	75-71-8	UJ
DUP1_021216	Wet Chem	Hexavalent Chromium	18540-29-9	UJ
DUP1_021216	Metals	Manganese	7439-96-5	J
DUP1_021216	Metals	Potassium	7440-09-7	J
DUP1_021216	Metals	Sodium	7440-23-5	J
DUP1_021216	Metals	Aluminum	7429-90-5	J
DUP1_021216	Metals	Arsenic	7440-38-2	J
DUP1_021216	Metals	Calcium	7440-70-2	J
DUP1_021216	VOCs	Dichlorodifluoromethane	75-71-8	UJ
SB2W1_0.5-2	Metals	Total Lead	7439-92-1	J
SB2S1_0.5-2	Metals	Total Lead	7439-92-1	J
SB2S1_2-4	Metals	Total Lead	7439-92-1	J
SB2R_FILL (6-8)	VOCs	4-Methyl-2-pentanone	108-10-1	UJ
SB2R_FILL (6-8)	VOCs	TBA	75-65-0	UJ
SB2R_FILL (6-8)	VOCs	Acrolein	107-02-8	UJ
SB2R_FILL (6-8)	VOCs	2-Hexanone	591-78-6	UJ
SB2R_FILL (6-8)	Metals	Barium	7440-39-3	J
SB2R_FILL (6-8)	Metals	Calcium	7440-70-2	J
SB2N1_0.5-2	Metals	Total Lead	7439-92-1	J
SB2N1_2-4	Metals	Total Lead	7439-92-1	J
SB2E1_0.5-2	Metals	Total Lead	7439-92-1	J
SB2E1_4-6	Metals	Total Lead	7439-92-1	J
SB2E2_2-4	Metals	Total Lead	7439-92-1	J
FB_021216	VOCs	Hexachlorobutadiene	87-68-3	UJ
FB_021216	SVOCs	Benzidine	92-87-5	UJ
FB_021216	Metals	Arsenic	7440-38-2	U (0.005)
FB_021216	VOCs	Tetrachloroethene	127-18-4	UJ
TB_021216	VOCs	Hexachlorobutadiene	87-68-3	UJ
TB_021216	VOCs	Tetrachloroethene	127-18-4	UJ

Major Deficiencies:

Major deficiencies include those that grossly impact data quality and necessitate the rejection

of results. No major deficiencies were identified.

Minor Deficiencies:

Minor deficiencies include anomalies that directly impact data quality and necessitate qualification, but do not result in unusable data. The section below describes the minor deficiencies that were identified.

VOCs by SW-846 Method 8260C:

LCSD WG867228-2 displayed a recovery of acetone greater than the upper control limit at 144%. The associated positive sample results are qualified as "J."

LCS/LCSD WG867241-1/2 displayed recoveries less than the lower control limit for 2-hexanone at 68% and 64%, respectively. The associated non-detect sample result is qualified as estimated.

LCS/LCSD WG867586-1/2 displayed recoveries less than the lower control limit for 1,2,3-trichlorobenzene (47% and 57%) and 1,2,4-trichlorobenzene (63% and 65%). The associated non-detect sample results are qualified as "UJ."

LCS/LCSD WG867947-1/2 displayed a recovery greater than the upper control limit for trichlorofluoromethane at 141%, chloromethane at 133%, acrylonitrile at 132%, and cyclohexane at 145%. The associated positive result for chloromethane is qualified as "J."

LCS/LCSD WG865265-1/2 displayed a recovery less than the lower control limit for hexachlorobutadiene at 60%. The associated non-detect sample results are qualified as "UJ."

LCS/LCSD WG866653-1/2 displayed recoveries greater than the upper control limit for chloromethane at 131%, acetone at 145%, and 2,2-dichloropropane at 131%. The associated positive results for acetone are qualified as "J."

LCS/LCSD WG866664-1/2 displayed recoveries less than the lower control limit for 4-methyl-2-pentanone, TBA, acrolein and 2-hexanone. The associated non-detect sample results are qualified as "UJ."

LCS/LCSD WG866664-4/5 displayed recoveries less than the lower control limit for 4-methyl-2-pentanone and 2-hexanone. The associated non-detect sample results are qualified as "UJ."

The continuing calibration analyzed on 2/23/16 at 07:51 displayed a %D greater than the control limit with a negative bias for 1,2,3-trichlorobenzene at 53%. The associated sample results were non-detect and are qualified as "UJ."

The continuing calibration analyzed on 2/23/16 at 08:52 displayed a %D greater than the control limit with a negative bias for dichlorodifluoromethane at 58%. The associated sample results were non-detect and are qualified as "UJ."

Sample SB12_6-8 displayed an internal standard area count less than the lower control limit for 1,4-dichlorobenzene-d4 at 39%. Results for compounds quantitated against 1,4-dichlorobenzene-d4 are qualified as estimated.

Sample SB17_0.5-2.5 displayed an internal standard area count less than the lower control limit for 1,4-dichlorobenzene-d4 at 36%. Results for compounds quantitated against 1,4-dichlorobenzene-d4 are qualified as estimated.

The continuing calibration analyzed on 2/14/16 at 20:55 displayed %Ds greater than the control limit with negative biases for tetrachloroethene and hexachlorobutadiene at 23% and 37%, respectively. The associated sample results were non-detect and are qualified as "UJ."

The continuing calibration analyzed on 2/18/16 at 08:04 displayed a %D greater than the control limit with a positive bias for acetone. The associated positive sample results are qualified as "J."

The continuing calibration analyzed on 2/18/16 at 20:12 displayed a %D greater than the control limit with a negative bias for dichlorodifluoromethane. The associated sample results are qualified as estimated.

The continuing calibration analyzed on 2/14/16 at 20:55 displayed %Ds greater than the control limit with negative biases for tetrachloroethene and hexachlorobutadiene. The associated sample results are qualified as estimated.

SVOCs by SW-846 Method 8270D:

Method blank sample WG867103-1 displayed a positive detection for bis(2-ethylhexyl)phthalate 69 µg/kg. The associated positive detections are qualified as "U" at the reporting limit.

LCS/LCSD WG867039-2/3 displayed recoveries less than the lower control limit for hexachlorocyclopentadiene at 23% and 24%, respectively. The associated sample result is qualified as "UJ."

LCS/LCSD WG867108-2/3 displayed recoveries less than the lower control limit for hexachlorocyclopentadiene at 29% and 33%. The associated sample results are qualified as "UJ."

LCS/LCSD WG865779-2/3 did not recover for benzidine. The associated field blank sample result is qualified as "UJ."

Pesticides by SW-846 Method 8081B:

Sample DUP2_021516 displayed dual column imprecision between the front and rear chromatography column for endrin, and endrin ketone. The associated positive detections are qualified as "J."

Sample DUP2_021616 displayed dual column imprecision for endrin ketone, 4,4'-DDT, and endosulfan II. The associated positive detections are qualified as "J."

Sample SR13R_9-11 displayed dual column imprecision for endrin, endrin ketone, endosulfan II, and endosulfan sulfate. The associated positive detections are qualified as "J."

Sample SB19_27-29 displayed dual column imprecision for 4,4'-DDD and chlordane. The associated positive detections are qualified as "J."

Sample SB19_33-34 displayed dual column imprecision for 4,4'-DDT and endosulfan sulfate. The associated positive detections are qualified as "J."

Sample SB14_9-11 displayed surrogate recoveries for TCMX and DCB greater than the upper control limit at 176%, 527%, and 176%. The associated positive detection is qualified as "J."

Sample SB11_0.5-2.5 displayed dual column imprecision for 4,4'-DDT. The associated positive detections are qualified as "J."

Sample SB10_0.5-2.5 displayed dual column imprecision for 4,4'-DDT. The associated positive detections are qualified as "J."

Metals by SW-846 Method 6020A and 6010C:

Method blank sample WG866265-1 displayed positive detections for antimony, chromium, nickel and sodium. The associated positive detections were in the field blank were qualified as "U" at the reporting limit.

Method blank sample WG865245-1 displayed positive detections for arsenic, calcium, and magnesium. The associated positive detections were in the field blank were qualified as "U" at the reporting limit.

MS/SD sample SB10_11-12 displayed recoveries greater than the control limits for manganese, potassium and sodium. The associated positive detections are qualified as "J."

Laboratory duplicate sample L1603888-03 displayed RPDs greater than the control limit for barium at 78% and calcium at 29%. The associated sample results are qualified as estimated.

Laboratory duplicate samples L1603930-20 and L1607242-01 displayed RPDs greater than the control limit for total lead. The associated positive detections are qualified as estimated.

Cyanide by SW-846 Method 9010C/9012B:

LCS WG866487-2 and LCS WG866488-3 displayed recoveries for cyanide greater than the upper control limit at 133% and 131%, respectively. The associated positive detections are qualified as "J."

MS/SD sample SB10__11-12 displayed a recovery less than the lower control limit at 38% and a RPD greater than the control limit at 76%. The associated non-detect sample result is qualified as "UJ."

Hexavalent Chromium by SW-846 Method 7196A:

LCS/LCSD samples WG866077-2 and WG866078-2 displayed recoveries slightly less than the lower control limit for hexavalent chromium at 75% and 78%, respectively. The associated sample results are qualified as estimated.

Other Deficiencies:

Other deficiencies include anomalies that do not directly impact data quality and do not necessitate qualification. The section below describes the other deficiencies that were identified.

VOCs by SW-846 Method 8260C:

Field blank sample FB_021716 and trip blank sample TB_021716 displayed positive detections for acetone at 1.6 µg/L and 1.5 µg/L, respectively. The associated sample results were either non-detect or orders of magnitude greater than the blank amounts; qualification is not necessary.

Method blank WG867947-3 displayed positive detections for chloromethane at 46 µg/kg and naphthalene at 12 µg/kg. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

LCS/LCSD WG867837-1/2 displayed recoveries greater than the upper control limit for acrylonitrile at 138% and TBA at 137%. The associated sample results were non-detect; qualification is not necessary.

Samples SB18_27-29 and DUP2_021516 were received by the laboratory slightly outside of the 48 hour holding time window for volatile preparation. On the basis of professional judgment, qualification is not necessary.

Sample SB12_6-8 displayed a surrogate recovery greater than the upper control limit for 4-BFB. The only positive detection in the sample was acetone; on the basis of professional judgment, qualification is not necessary.

Field blank sample FB_021216 and trip blank sample TB_021216 displayed positive detections for acetone at 1.9 μg/L and 1.6 μg/L, respectively. The associated sample results were either non-detect or orders of magnitude greater than the blank amounts; qualification is not necessary.

Method blank WG866653-3 displayed a positive detection for acetone. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

Method blank WG866698-3 displayed a positive detection for acetone. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

MS/SD sample SB10_11-12 displayed RPDs greater than the control limit for trichlorofluoromethane, acetone, vinyl acetate, methyl acetate, and 1,4-dioxane. The MS/SD recoveries of dichlorodifluoromethane, 1,2-dibromo-3-chloropropane, hexachlorobutadiene, naphthalene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, acrolein, 1,4-dioxane, 1,2,4,5-tetramethylbenzene, and trans-1,4-dichloro-2-butene were also outside of control limits. Data is not qualified on the basis of MS/SD recoveries or RPDs alone.

Sample SB17_0.5-2.5 displayed a surrogate recovery for 4-BFB greater than the upper control limit at 141%. The remaining three VOC surrogates recovered within control. On the basis of professional judgment, qualification is not necessary.

Sample SB12_6-8 displayed a surrogate recovery for 4-BFB greater than the upper control limit at 156%. The remaining three VOC surrogates recovered within control. On the basis of professional judgment, qualification is not necessary.

The continuing calibration analyzed on 2/22/16 at 07:19 displayed a %D greater than the control limit with a positive bias for trichloroethene. The associated sample results were non-detect; qualification is not necessary.

The continuing calibration analyzed on 2/23/16 at 08:52 displayed a %D greater than the control limit with a positive bias for cis-1,3-dichloropropene. The associated sample results were non-detect; qualification is not necessary.

SVOCs by SW-846 Method 8270D:

LCS/LCSD WG867103-2/3 displayed recoveries greater than the upper control limit for 2,4-dinitrotoluene at 91% and 96%. The associated sample results were non-detect; qualification is not required.

LCS/LCSD WG867108-2/3 displayed recoveries greater than the upper control limit for 2,4-dinitrotoluene at 92% and 95%. The associated sample results were non-detect; qualification is not required.

LCS/LCSD WG866698-1/2 displayed recoveries greater than the upper control limit for chloromethane at 137% and RPDs greater than the control limit for bromomethane and vinyl chloride. The associated sample results were non-detect; equalization is not necessary.

LCS/LCSD WG865779-2/3 displayed recoveries greater than the upper control limit for 2,4-dinitrotoluene at 96% and 98% and p-chloro-m-cresol at 99% and 104%. In addition, the LCS/LCSD RPD for benzoic acid was greater than the control limit at 42%. The associated sample results were non-detect; qualification is not required.

LCS/LCSD WG866052-2/3 displayed recoveries greater than the upper control limit for 2,4-dinitrotoluene at 92%. The associated sample results were non-detect; qualification is not required.

MS/MSD sample SB10_11-1 displayed recoveries greater than the upper control limit for 2,4-dinitrotoluene, biphenyl, p-chloro-m-cresol, 2-chlorophenol, 4-nitrophenol, phenol and benzidine. The associated sample results were non-detect; qualification is not required.

Sample SB17_0.2-2.5 displayed a surrogate recovery greater than the upper control limit for 4-terphenyl-d14 at 121%. The remaining two base-neutral surrogates recovered within control. On the basis of professional judgment, qualification is not necessary.

Samples SB14_9-11 and SB16_9-11 did not recover for any surrogate at a 40X dilution. The surrogates were affected by dilution; qualification is not necessary.

Samples SB16_1-3 displayed a surrogate recovery greater than the upper control limit for 4-terphenyl-d14 at 121%. The remaining two base-neutral surrogates recovered within control. On the basis of professional judgment, qualification is not necessary.

Sample SB11_0.5-2.5 did not recover for any surrogate at a 40X dilution. The surrogates were affected by dilution; qualification is not necessary.

Samples SB18_27-29 displayed a surrogate recovery greater than the upper control limit 2-fluorobiphenyl at 123%. The remaining two base-neutral surrogates recovered within control. On the basis of professional judgment, qualification is not necessary.

Sample SB19_27-29 did not recover for any surrogate at a 20X dilution. The surrogates were affected by dilution; qualification is not necessary.

The continuing calibration analyzed on 2/24/16 at 07:28 displayed %Ds greater than the control limit with positive biases for 2-nitrophenol, 2,4-dinitrophenol, 2,4-dichlorotoluene, and 2,4-dinitrotoluene. The associated sample results were non-detect; qualification is not necessary.

The continuing calibration analyzed on 2/22/16 at 18:25 displayed a %D greater than the control limit with a positive bias for 2,4-dinitrotoluene. The associated sample results were non-detect; qualification is not necessary.

The continuing calibration analyzed on 2/25/16 at 11:05 displayed %Ds greater than the control limit with positive biases for atrazine and 2,4-dinitrotoluene. The associated sample results were non-detect; qualification is not necessary.

The continuing calibrations analyzed on 2/25/16 at 11:05 and 2/24/16 at 11:17 displayed %Ds greater than the control limit with negative biases for hexachlorocyclopentadiene. The associated sample results were previously qualified; no further action is necessary.

Multiple continuing calibrations displayed %Ds greater than the control limits with positive biases for benzaldehyde and atrazine. The associated sample results were non-detect; qualification is not necessary.

Pesticides by SW-846 Method 8081B:

MS/SD sample L1604283-02 displayed a recovery greater than the upper control limit for endrin. The spiked volume did not originate from the Site; qualification is not required.

Sample SB14_1-3 displayed a surrogate recovery for DCB greater than the upper control limit. The associated sample results were non-detect; qualification is not required.

Sample SB10_11-12 displayed a surrogate recovery for TCMX greater than the upper control limit. The associated sample results were non-detect; qualification is not required.

LCS/LCSD WG866129-2/3 displayed a recovery greater than the upper control limit for 4,4'-DDD. The associated sample results were non-detect; qualification is not required.

MS/SD sample L1603922-03 displayed recoveries greater than the upper control limits for a majority of compounds. The spiked volume did not originate from the Site; qualification is not required.

Metals by SW-846 Methods 6020A and 6010C:

Field blank sample FB_021716 displayed positive detections for antimony, barium, chromium, nickel, sodium, and zinc. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

Method blank sample WG866355-1 displayed positive detections for iron and manganese. The associated sample results were orders of magnitude greater than the blank amount; qualification is not necessary.

Field blank sample FB_021216 displayed positive detections for arsenic and iron. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

Method blank sample WG865460-1 displayed a positive detection for sodium at 14 mg/kg. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

Method blank sample WG865600-1 displayed a positive detection for thallium at 0.17 mg/kg. The associated sample results were non-detect; qualification is not necessary.

MS/SD sample L1603888-03 displayed a recovery greater than the upper control limit for aluminum. The spiked volume did not originate from the Site; qualification is not necessary.

MS sample WG874187-4 displayed a recovery greater than the upper control limit for lead. The spiked volume did not originate from the Site; qualification is not necessary.

MS sample SB2W1_0.5-2 did not recover (i.e., 0%) for total lead. The sample concentration was more than 4X the spiked amount; qualification is not required.

Mercury by SW-846 Methods 7470A and 7471B:

MS/SD sample L1604283-02 displayed recoveries greater than the upper control limit for mercury. The spiked volume did not originate from the Site; qualification is not required.

MS/SD sample L1604231-02 displayed recoveries greater than the upper control limit for aluminum, iron, magnesium, potassium, and sodium. The spiked volume did not originate from the Site; qualification is not required.

MS/SD sample L1604355-04 displayed recoveries greater than the upper control limit for calcium, iron, magnesium, and manganese. The spiked volume did not originate from the Site; qualification is not required.

MS/SD sample SB10_11-12 displayed recoveries greater than the upper control limit at 138% and 137%. The associated sample result was non-detect; qualification is not necessary.

Cyanide by SW-846 Method 9010C/9012B:

Field blank sample FB_021716 displayed a positive detection for total cyanide. The associated positive detections were orders of magnitude greater than the blank amount; qualification is not necessary.

Comments:

Field duplicate and parent sample pairs were collected and analyzed for all parameters. For results less than 5X the RL, analytes meet the precision criteria if the absolute difference is less than ±2X the RL. For results greater than 5X the RL, analytes meet the precision criteria if the RPD is less than or equal to 50%. The following analytes did not meet the precision criteria:

- DUP2_021516 and SB18_27-29: ethylbenzene, m/p-xylenes, naphthalene, p-ethyl toluene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, acenaphthylene, anthracene, benzo(g,h,i)perylene, fluorene, phenanthrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, pyrene, biphenyl, dibenzofuran, 2-methylnaphthalene, endrin, endrin aldehyde, endrin ketone, 4,4'-DDT.
- DUP2_021616 and SB12_2-4: acenaphthene, fluoranthene, bis(2-ethylhexyl)phthalate, phenanthrene, and pyrene.
- DUP-1_021216 and SB10_11-12: aluminum, arsenic, calcium, manganese, potassium, sodium.
- DELDUP-1_021216(4-6) and SB2S1_4-6: Held and not analyzed.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical methods with the exception of errors discussed above. If a given fraction is not mentioned

above, that means that all specified criteria were met for that parameter. All of the data packages met ASP Category B requirements.

All data are considered usable, as qualified. In addition, completeness, defined as the percentage of analytical results that are judged to be valid, is 100%.

Signed:

Emily Strake
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