LACKAWANNA INCINERATOR SITE

ERIE COUNTY

LACKAWANNA, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 915206

Prepared for:

New York State Department of Environmental Conservation

Division of Environmental Remediation

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

OCTOBER 2022

CERTIFICATION STATEMENT

I, Michael L. Spera certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

_____ P.E.

October 24, 2022

_____DATE

TABLE OF CONTENTS

LACKAWANNA INCINERATOR SITE

ERIE COUNTY

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SITE MANAGEMENT PLAN

Table of Contents

TABLE OF CONTENTS (Continued)

List of Tables

List of Figures

TABLE OF CONTENTS (Continued)

List of Appendices

List of Acronyms

AS	Air Sparging
AMSL	above mean sea level
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
EE	Environmental Easement
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan

RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: Site No. 915206 Lackawanna Incinerator Site

Institutional Controls:	1. The Lackawanna Incinerator portion of the property may be used for Commercial Use; the Smokes Creek Corridor portion of the property may be used for Commercial Use.	
	2a. Groundwater Use is Prohibited 2b. Lackawanna Incinerator portion - Property Use is Commercial Use; Smokes Creek Corridor – Property Use is Commercial. 2c. Environmental Easement	
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.	
Engineering Controls:	1. Cover system	
Inspections:		Frequency
1. Cover inspection		Annually
Monitoring:		
1. Groundwater Monitoring Wells MW-02A, MW-03A, MW-04, MW-06, MW-07, and MW-08.		Annually
Maintenance:		
1. Landscape Cover – Mowing Only		As needed

Site Identification: Site No. 915206 Lackawanna Incinerator Site

Reporting:	
1. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Lackawanna Incinerator Site located in Lackawanna, New York (hereinafter referred to as the "Site"). See Figure 1-1 – Site Location Map. The Site is currently in the New York State (NYS) State Superfund Program, Site No. 915206, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

A figure showing the site layout and boundaries of this site is provided in Figure 1-2 – Site Plan and Boundary Map. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC and recorded with the Erie County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix B of this SMP.

This SMP was prepared by AECOM USA, Inc. on behalf of NYSDEC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in site use that are required under 6 NYCRR Part 375 and/or Environmental Conservation Law.
2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
5. Notice within 48 hours of any non-routine maintenance activities.
6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

8. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of all approved work plans and reports, including this SMP.

9. Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1-1 on the following page includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table 1-1: Notifications*

Name	**Contact Information**	**Required Notification****
Evelyn Hussey	518.402.6786 evelyn.hussey@dec.ny.gov	All Notifications
Sarah Saucier	518.402.9675 Sarah.Saucier@dec.ny.gov	All Notifications
Leonard Zinoman	518.402.9553 leonard.zinoman@dec.ny.gov	Notifications 1 and 8
Daniel P. Tucholski	518.486.7016 daniel.tucholski@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Lackawanna, Erie County, New York and is identified as Section 142.14 Block 1 and Lot 4.1 (Lackawanna Incinerator portion of the property, and Section 142.14 Block 1 and Lot 5.112 (Smokes Creek Corridor portion of the property) on the Erie County Tax Map. The site is an approximately 7.6-acre area and is bounded by the north branch of Smokes Creek to the north, residential properties to the south, a grassy field that is part of the Baker Hall School property to the east, and a sports athletic field and asphalt parking lot to the west (see Figure 1-2 – Site Plan and Boundary Map). The boundaries of the site are more fully described in Appendix A –Environmental Easement. The owner of the site parcels at the time of issuance of this SMP is/are:

- The City of Lackawanna

2.2 Physical Setting

2.2.1 Land Use

The Site is divided into two areas of concern, the Incinerator Area and the Smokes Creek Corridor. The Incinerator Area consists of the following: two red-brick, multi-story buildings that housed municipal solid waste incinerators, and associated chimneys. In the center of the site is a ramp, constructed of fill (approximately 20 feet in elevation at its highest), that provides access to the northern incinerator's third floor. There is a primarily unpaved area on the southern portion of property with a framed shed currently used to house equipment by the City Department of Public Works (DPW). The Smokes Creek Corridor comprises the northern portion of the site, where an asphalt paved recreational trail runs east to west along the top of the embankment to Smokes Creek.

The Incinerator Area is zoned Property Class 662 – Police Fire, and is currently utilized for commercial uses such as materials staging and equipment/vehicle storage. Site occupants include the City of Lackawanna DPW and the City of Lackawanna animal control. The Smokes Creek Corridor area is zoned as Property Class 330 – Vacant Commercial. The primary use of the Smokes Creek Corridor is for commercial purposes and flood control. However, the City maintains a recreational path along the south side of the Smokes Creek Corridor, and it is used for passive recreation activities that include walking, cycling and fishing.

The properties adjoining the Site neighborhood surrounding the Site primarily include mixed commercial and residential properties. The properties immediately south of the Site include commercial and residential properties; the properties immediately north of the Site include commercial properties; the properties immediately east of the Site include commercial and residential properties; and the properties to the west of the Site include commercial and residential properties.

2.2.2 Geology

A review of the geologic map of New York, Niagara Sheet published by the University of the State of New York, the State Education Department, dated 1970, identifies the native material underlying the site as glaciolacustrine deposits overlying shale and mudrock of the Levanna Shale Member of the Skaneateles Formation.

Past subsurface investigations have determined that overburden at the site consists of fill material underlain by Pleistocene glaciolacustrine deposits. The fill material consists of reworked silt and clay intermixed with varying amounts of slag and gravel, as well as trace amounts of coal, wood, metal, glass, cinders, brick, and ash. The fill material is typically dense and ranges from dry to moist. In some on-site and adjacent off-site areas, a portion of the fill material is likely derived from former incinerator operations, based on the presence of cinders and gravel-sized rounded glass that appears to have been melted and subsequently hardened.

Glaciolacustrine deposits consist primarily of reddish brown to gray laminated silt, clay, silty clay, and clayey silt of moderate to high plasticity. Consistency of this unit decreases from hard/stiff to softer with depth due to an increase in moisture content at depth. Horizontal and vertical laminations and fractures were observed in the glaciolacustrine deposits. Lenses containing varying amounts of fine to very fine sand were encountered in some borings but were not consistent throughout the site. Glacial till, consisting of clay and silt with some fine sand and gravel, was encountered at one location. Site specific boring logs are provided in Appendix C.

Elevations at the site range from approximately 585 feet to 615 feet above mean sea level (AMSL) with native soil/fill interface consistently around 591-593 AMSL. During previous investigations, the maximum drilling depth was 28 feet below ground surface (bgs) and bedrock was not encountered.

2.2.3 Hydrogeology

The local water table exists from 586-589 AMSL, within the glaciolacustrine deposits from approximately 6 to 10 feet below ground surface (excluding the area of the fill ramp). Shallow groundwater flow at the site is generally north towards Smokes Creek, as shown in Figure 2-1 – Groundwater Contour Map. Saturated soil was observed at a depth of approximately 10 ft bgs in the soil ramp, which may be indicative of perched water in the ramp area with the glaciolacustrine silt and clay serving as a confining unit. Groundwater elevation data is provided in Table 2-1 (included at the end of section 2). Groundwater monitoring well construction logs are provided in Appendix C.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

Summary of Remedial Investigation

Remedial Investigation (RI) field activities were conducted between October 2012 and February 2014 by NYSDEC Standby Engineer, EA Engineering (EA, 2017). During the initial phase (Phase I) of the RI, laboratory analysis included the following analytical suites: TCL VOCs, TCL SVOCs, TAL metals, TCL pesticides, TCL PCBs, and total cyanide. During Phase I, TCL VOCs, TCL SVOCs, TCL pesticides, TCL PCBs, and total cyanide were not detected in samples, were detected in background samples in similar concentrations, or were identified in isolated samples, not indicative of an area of contamination. Based on a review of the analytical results for Phase I samples, the analyte list was truncated for subsequent events. During off-site delineation phases (Phase II-V) that followed, the analytical list was focused on site-related Contaminants of Concern (i.e., TAL metals).

Based on RI sampling results, surface and subsurface soil results indicated that several inorganic constituents, primarily arsenic and lead, were present at concentrations that exceeded 6 NYRCRR Part 375 Unrestricted Use, Restricted Residential and Commercial SCOs in the soil/fill material at the site. Specifically, lead was detected up to 6,820 parts per million (ppm) on the DPW Incinerator Area within the northern ramp and up to 8,210 ppm along the Smokes Creek Corridor. Arsenic was detected up to 28 ppm on the DPW Incinerator Area within the northern ramp and up to 80 ppm along the Smokes Creek Corridor. In addition to sampling conducted during the RI, analysis of ash samples taken from the ground floor of the Southern Incinerator Building (2005 PSA) indicated lead concentrations up to 23,600 ppm. In addition to the metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), and pesticides were found above Unrestricted Use SCOs at various sample locations.

One detection of lead (30.5 parts per billion (ppb); November 2012) and one of arsenic (43.7 ppb; April 2013) exceeded Class GA standards and guidance values in groundwater samples collected from monitoring well MW-07 located along the northern

site boundary, north of the ramp. All other inorganic constituents that exceeded Class GA SCGs in DPW Incinerator Area monitoring wells were detected at similar or lesser concentrations from the upgradient monitoring well, suggesting these constituents were unlikely to be related to on-site contaminated soil. The area is serviced by public drinking water from the Erie County Water Authority (ECWA).

A Fish and Wildlife Impact Analysis (FWRIA) was conducted to identify existing and potential impacts from the site to fish and wildlife receptors. In general, based on screening results reviewed under the FWRIA, surface water serves as a potential exposure pathway to fish and wildlife near the site. However, the creek (surface water and sediment) does not appear to have been impacted by site-related contamination based on the RI sampling results.

The data from the RI identified two contaminants of concern, lead and arsenic, which exceeded the applicable SCG for soil.

Interim Remedial Measure

An Interim Remedial Measure (IRM) was performed by NYSDEC's Standby Engineer between October 2014 and May 2015 in the Incinerator Area (EA, 2015). The IRM entailed the excavation and off-site disposal of all impacted soils exceeding Part 375 Residential Use SCOs (approximately 7,900 cubic yards). Incinerator ash/dumped material ranged from 2 to 4 feet with areas tailing to < 1 foot. Demarcation fabric was placed prior to backfill to identify the extent of excavation. The excavated area was backfilled with common fill and finished with 6 inches of topsoil and then seeded with grass. Common fill material imported to the site was sampled and tested in accordance with DER-10 Section 5.4(e)10 to confirm attainment of the appropriate land use SCOs (Residential Use). All topsoil imported to the site and placed met the requirements of DER-10 and NYSDOT 713-01 in accordance with Section 02480. A permanent fence was installed along the northern

and western property lines. The IRM is documented in the Interim Remedial Measure Construction Completion Report dated September 2015.

Pre-Design Investigation

In 2019, AECOM (formerly URS Corporation - New York [URS]) conducted a Pre-Design Investigation (PDI) to fill data gaps concerning the horizontal extent of soil contamination along the south bank of Smokes Creek, collect solid waste characterization data, collect groundwater analytical data, and obtain engineering survey data. The findings of the PDI were used to present the design rationale, criteria, and analysis for a remedial design (RD) at Operable Unit Number 2 (OU2) of the Lackawanna Incinerator Site. The work associated with the Lackawanna Site PDI was completed under NYSDEC Work Assignment No. D007622-54 (URS, December 2019).

Activities associated with the PDI consisted of:

- advancement of 50 shallow soil borings using a bucket auger to approximately 1-foot bgs;
- collection of one soil sample for analytical testing from each shallow soil boring location;
- collection of Quality Assurance/Quality Control samples;
- collection of groundwater samples from the pre-existing monitoring wells;
- collection of one composite soil sample for solid water characterization;
- removal of investigation derived waste (IDW - e.g., purge water and decontamination water); and
- a site survey, including soil sampling locations and monitoring wells.

Between March 26 and April 1, 2019, eight transects were established approximately 350 feet apart along the south side of the Smokes Creek Corridor beginning approximately 600 feet west of the western boundary of the DPW Incinerator property and extending approximately 1,800 feet east of the western boundary of the DPW Incinerator property. Transects were established perpendicular to the bicycle path and extend to Smokes Creek (i.e., approximately 50 feet). Soil sampling was conducted from 0 to 1-foot bgs using a bucket auger at approximately 6 to 8-foot intervals along each transect (i.e.,

approximately seven sample points per transect). The soil analytical results reported arsenic and lead detections above Commercial Use SCOs and are depicted in Figures 2-2 and 2-3.

Between April 4 and 10, 2019, groundwater samples were collected using standard low flow sampling methods at six existing monitoring well locations (MW-02A, MW-03A, MW-04, MW-06, MW-07, and MW-08). MW-05 was not sampled because it is missing and assumed to have been removed during remedial construction activities at the property. The groundwater analytical results reported above SCGs included arsenic at monitoring wells MW-03A, MW-06 and MW-07; and iron, magnesium, and sodium at monitoring wells MW-03A and MW-04. Lead and the non-metals were not detected in any of the groundwater samples.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Record of Decision (ROD) dated June 2017 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

2.5 Remaining Contamination

2.5.1 Soil

The remaining contaminants of concern at the Site have been identified as lead and arsenic as indicated in Figures 2-4 and 2-5. After completion of the remedial action excavation, only arsenic and lead remain at concentrations exceeding the Unrestricted Use SCOs and the Commercial Use SCOs beneath the constructed cover systems.

Incinerator Area

Remaining soil contamination in the Incinerator area exists at a depth of one foot bgs and deeper following the completion of remedial excavation activities (shown on Figure 2-4). A demarcation layer consisting of orange snow fence was placed over the entire remedial excavation floor. The excavation was then backfilled with imported certified clean materials.

A summary of the detected analytical results exceeding Commercial Use SCOs in the RI soil samples for the Incinerator Area is presented in Table 2-2 (included at the end of section 2).

Smokes Creek Corridor Area

Remaining soil contamination in the Corridor Area of the Site exists at a depth of one or two feet bgs and deeper (shown on Figure 2-5). The depth to remaining contamination at the top of the Smokes Creek embankment is one foot, however the depth to remaining contamination along the slope of the embankment is 2 feet. A demarcation layer consisting of orange snow fence was placed over the entire remedial excavation floor. The excavation was then backfilled with imported certified clean materials.

A summary of the detected analytical results exceeding Commercial Use SCOs in the RI soil samples for the Corridor Area is presented in Table 2-3 (included at the end of section 2).

2.5.2 Groundwater

Figure 2-6 summarizes the analytical results of contaminants/analytes detected in groundwater samples that exceed the SCGs. The sampling event was conducted in April 2019, prior to completion of the remedial action.

One detection of lead (30.5 ppb) and one of arsenic (43.7 ppb) exceeded Class GA standards and guidance values in groundwater samples from downgradient well MW-07. According to the ROD, all other inorganic constituents that exceeded Class GA SCGs in the DPW Incinerator Area monitoring wells were detected at similar or lesser concentrations in groundwater from the upgradient monitoring well, suggesting those constituents are unlikely to be related to on-site contaminated soil.

TABLE 2-1
GROUNDWATER ELEVATION DATA
LACKAWANNA INCINERATOR SITE

Location ID / Type	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date / Time	Depth to Water (ft)	Water Elev. (ft)	Product Thick. (ft)	Corrected Water Elev. (ft)	Remark
MW-02A MNW	1027450.399	1084753.744	595.70	595.70	598.19	A	4/8/2019 1030	12.39	585.80	0.00		
MW-03A MNW	1027162.282	1084602.833	596.40	596.40	596.14	A	4/9/2019 1500	7.32	588.82	0.00		
MW-04 MNW	1026893.482	1084710.752	596.45	596.45	596.22	A	4/8/2019 1200	6.56	589.66	0.00		
MW-06 MNW	1027339.157	1084566.434	595.07	595.07	594.80	A	4/10/2019 0715	6.73	588.07	0.00		
MW-07 MNW	1027450.337	1084651.689	595.41	595.41	595.15	A	4/10/2019 0820	9.65	585.50	0.00		
MW-08 MNW	1027476.560	1084456.249	593.56	593.56	593.42	A	4/4/2019 1300	9.65	583.77	0.00		

NM - No Measurement

Geologic Zone:
A Shallow Unconfined Aquifer

Type:
MNW Monitoring Well

The value noted in the column labeled Specific Gravity is an assumed value for free product, if found.

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-1A	TS-1B	TS-1C	TS-1D	TS-1E
Sample ID				TS-1A	TS-1B	TS-1C	TS-1D	TS-1E
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/26/19	03/26/19	03/26/19	03/26/19	03/26/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	NA	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	NA	NA	NA	NA	NA
Arsenic	MG/KG	13	16	9.3	10.1	10.2	6.9	7.0
Barium	MG/KG	350	400	NA	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	NA	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	NA	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	NA	NA	NA	NA	NA
Chromium	MG/KG	30	1500	NA	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	NA	NA	NA	NA	NA
Copper	MG/KG	50	270	NA	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	NA	NA	NA	NA	NA
Lead	MG/KG	63	1000	224	29.5	39.8	18.7	43.8
Magnesium	MG/KG	-	-	NA	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	NA	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	NA	NA	NA	NA	NA
Nickel	MG/KG	30	310	NA	NA	NA	NA	NA
Potassium	MG/KG	-	-	NA	NA	NA	NA	NA
Sodium	MG/KG	-	-	NA	NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	NA	NA	NA	NA	NA
Zinc	MG/KG	109	10000	NA	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

J = The reported concentration is an estimated value.

J- = The reported concentration is an estimated value biased low. J+ = The reported concentration is an estimated value biased high.

Only Detected Results Reported.

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-1F	TS-2A	TS-2B	TS-2C	TS-2D
Sample ID				TS-1F	TS-2A	TS-2B	TS-2C	TS-2D
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/26/19	03/26/19	03/26/19	03/26/19	03/26/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	9,570	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-		NA	NA	NA	NA
Arsenic	MG/KG	13	16	5.3	10.9	10.1	11.2	27.0
Barium	MG/KG	350	400	60.2	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	0.50	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	0.51	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	11,600	NA	NA	NA	NA
Chromium	MG/KG	30	1500	16.8 J+	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	9.3	NA	NA	NA	NA
Copper	MG/KG	50	270	23.2	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	17,800	NA	NA	NA	NA
Lead	MG/KG	63	1000	31.7	147	95.5	17.7	17.7
Magnesium	MG/KG	-	-	5,510	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	436	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	0.051	NA	NA	NA	NA
Nickel	MG/KG	30	310	27.1	NA	NA	NA	NA
Potassium	MG/KG	-	-	1,640 J-	NA	NA	NA	NA
Sodium	MG/KG	-	-	86.9 J	NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	19.0 J-	NA	NA	NA	NA
Zinc	MG/KG	109	10000	102	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

J = The reported concentration is an estimated value.

J- = The reported concentration is an estimated value biased low. J+ = The reported concentration is an estimated value biased high.

Only Detected Results Reported.

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-2E	TS-2F	TS-3A	TS-3B	TS-3C
Sample ID				TS-2E	TS-2F	TS-3A	TS-3B	TS-3C
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/26/19	03/26/19	03/27/19	03/27/19	03/27/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	NA	10,900	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	NA		NA	NA	NA
Arsenic	MG/KG	13	16	6.9	6.4	21.0	8.7	15.4
Barium	MG/KG	350	400	NA	67.5	NA	NA	NA
Beryllium	MG/KG	7.2	590	NA	0.56	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	NA	0.64	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	NA	16,300	NA	NA	NA
Chromium	MG/KG	30	1500	NA	17.7	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	NA	10.4	NA	NA	NA
Copper	MG/KG	50	270	NA	27.9	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	NA	20,200	NA	NA	NA
Lead	MG/KG	63	1000	69.3	40.8	1,990	21.5	33.0
Magnesium	MG/KG	-	-	NA	6,180	NA	NA	NA
Manganese	MG/KG	1600	10000	NA	495	NA	NA	NA
Mercury	MG/KG	0.18	2.8	NA	0.051	NA	NA	NA
Nickel	MG/KG	30	310	NA	30.6	NA	NA	NA
Potassium	MG/KG	-	-	NA	1,920 J-	NA	NA	NA
Sodium	MG/KG	-	-	NA	122 J	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	NA	21.7 J-	NA	NA	NA
Zinc	MG/KG	109	10000	NA	117 J-	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

J = The reported concentration is an estimated value.

J- = The reported concentration is an estimated value biased low. J+ = The reported concentration is an estimated value biased high.

Only Detected Results Reported.

Advanced Selection: Soils Met 2019
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[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-3D	TS-3E	TS-3F	TS-4A	TS-4A
Sample ID				TS-3D	TS-3E	TS-3F	FD32719-1	TS-4A
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/27/19	03/27/19	03/27/19	03/27/19	03/27/19
Parameter	Units	Criteria (1)	Criteria (2)				Field Duplicate (1-1)	
Metals								
Aluminum	MG/KG	10000 CP-51	-	10,700 J-	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-		NA	NA	NA	NA
Arsenic	MG/KG	13	16	9.3 J+	10.6	4.9	10.4	8.9
Barium	MG/KG	350	400	68.5	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	0.55	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	0.66	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	19,900	NA	NA	NA	NA
Chromium	MG/KG	30	1500	16.9	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	12.8	NA	NA	NA	NA
Copper	MG/KG	50	270	29.3	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	22,600 J-	NA	NA	NA	NA
Lead	MG/KG	63	1000	70.6	154	21.6	266	260
Magnesium	MG/KG	-	-	9,150	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	541	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	0.019 J	NA	NA	NA	NA
Nickel	MG/KG	30	310	35.0	NA	NA	NA	NA
Potassium	MG/KG	-	-	1,970	NA	NA	NA	NA
Sodium	MG/KG	-	-		NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	20.9	NA	NA	NA	NA
Zinc	MG/KG	109	10000	85.6	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

J = The reported concentration is an estimated value.

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Only Detected Results Reported.

Advanced Selection: Soils Met 2019
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[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-4B	TS-4B	TS-4C	TS-4D	TS-4E
Sample ID				FD32719-2	TS-4B	TS-4C	TS-4D	TS-4E
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/27/19	03/27/19	03/27/19	03/27/19	03/27/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**	Field Duplicate (1-1)				
Metals								
Aluminum	MG/KG	10000 CP-51	-	NA	NA	NA	NA	10,400 J-
Antimony	MG/KG	12 CP-51	-	NA	NA	NA	NA	
Arsenic	MG/KG	13	16	6.8	7.8	9.1	8.7	5.8 J+
Barium	MG/KG	350	400	NA	NA	NA	NA	67.0
Beryllium	MG/KG	7.2	590	NA	NA	NA	NA	0.54
Cadmium	MG/KG	2.5	9.3	NA	NA	NA	NA	0.62
Calcium	MG/KG	10000 CP-51	-	NA	NA	NA	NA	13,000
Chromium	MG/KG	30	1500	NA	NA	NA	NA	16.5
Cobalt	MG/KG	20 CP-51	-	NA	NA	NA	NA	9.6
Copper	MG/KG	50	270	NA	NA	NA	NA	26.0
Iron	MG/KG	2000 CP-51	-	NA	NA	NA	NA	18,300
Lead	MG/KG	63	1000	22.2 J	69.5 J	39.8	34.1	39.7
Magnesium	MG/KG	-	-	NA	NA	NA	NA	5,630
Manganese	MG/KG	1600	10000	NA	NA	NA	NA	418
Mercury	MG/KG	0.18	2.8	NA	NA	NA	NA	0.047
Nickel	MG/KG	30	310	NA	NA	NA	NA	27.3
Potassium	MG/KG	-	-	NA	NA	NA	NA	2,040
Sodium	MG/KG	-	-	NA	NA	NA	NA	
Vanadium	MG/KG	39 CP-51	-	NA	NA	NA	NA	20.6
Zinc	MG/KG	109	10000	NA	NA	NA	NA	114

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

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Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

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[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-4F	TS-5A	TS-5B	TS-5C	TS-5D
Sample ID				TS-4F	TS-5A	TS-5B	TS-5C	TS-5D
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/27/19	03/28/19	03/28/19	03/28/19	03/28/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	NA	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	NA	NA	NA	NA	NA
Arsenic	MG/KG	13	16	5.2	21.7	7.8 J-	14.5 J-	10.9
Barium	MG/KG	350	400	NA	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	NA	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	NA	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	NA	NA	NA	NA	NA
Chromium	MG/KG	30	1500	NA	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	NA	NA	NA	NA	NA
Copper	MG/KG	50	270	NA	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	NA	NA	NA	NA	NA
Lead	MG/KG	63	1000	22.7	1,290	32.2 J-	21.6 J-	22.3 J-
Magnesium	MG/KG	-	-	NA	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	NA	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	NA	NA	NA	NA	NA
Nickel	MG/KG	30	310	NA	NA	NA	NA	NA
Potassium	MG/KG	-	-	NA	NA	NA	NA	NA
Sodium	MG/KG	-	-	NA	NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	NA	NA	NA	NA	NA
Zinc	MG/KG	109	10000	NA	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

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Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-5E	TS-5F	TS-6A	TS-6B	TS-6C
Sample ID				TS-5E	TS-5F	TS-6A	TS-6B	TS-6C
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/28/19	03/28/19	03/29/19	03/29/19	03/29/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	18,400 J-	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	1.4 J-	NA	NA	NA	NA
Arsenic	MG/KG	13	16	6.7	12.8	51.3	5.2	9.4
Barium	MG/KG	350	400	90.8	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	0.87	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	0.14 J	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	23,500	NA	NA	NA	NA
Chromium	MG/KG	30	1500	25.2	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	12.5	NA	NA	NA	NA
Copper	MG/KG	50	270	28.9	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	25,600	NA	NA	NA	NA
Lead	MG/KG	63	1000	19.5 J-	18.6 J-	2,010	34.1 J-	37.0 J-
Magnesium	MG/KG	-	-	11,400	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	300	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	0.016 J	NA	NA	NA	NA
Nickel	MG/KG	30	310	34.8	NA	NA	NA	NA
Potassium	MG/KG	-	-	4,020	NA	NA	NA	NA
Sodium	MG/KG	-	-	137 J	NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	33.0	NA	NA	NA	NA
Zinc	MG/KG	109	10000	77.3 J+	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

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Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

Advanced Selection: Soils Met 2019
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[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-6D	TS-6E	TS-6F	TS-7A	TS-7B
Sample ID				TS-6D	TS-6E	TS-6F	TS-7A	TS-7B
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/29/19	03/29/19	03/29/19	03/29/19	03/29/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	17,100 J-	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	1.9 J-	NA	NA	NA	NA
Arsenic	MG/KG	13	16	10.0	5.2	3.7 J-	5.9 J-	5.7 J-
Barium	MG/KG	350	400	82.7	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	0.83	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	0.24 J	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	17,200	NA	NA	NA	NA
Chromium	MG/KG	30	1500	23.8	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	18.8	NA	NA	NA	NA
Copper	MG/KG	50	270	34.4	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	34,300	NA	NA	NA	NA
Lead	MG/KG	63	1000	42.8 J-	22.6 J-	15.8 J-	72.9 J-	57.8 J-
Magnesium	MG/KG	-	-	8,380	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	603	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	0.028	NA	NA	NA	NA
Nickel	MG/KG	30	310	39.8	NA	NA	NA	NA
Potassium	MG/KG	-	-	4,070	NA	NA	NA	NA
Sodium	MG/KG	-	-	156 J	NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	32.6	NA	NA	NA	NA
Zinc	MG/KG	109	10000	98.6 J+	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

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[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-7C	TS-7D	TS-7E	TS-7F	TS-7G
Sample ID				TS-7C	TS-7D	TS-7E	TS-7F	TS-7G
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/29/19	03/29/19	03/29/19	03/29/19	03/29/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Metals								
Aluminum	MG/KG	10000 CP-51	-	14,900 J-	NA	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	1.5 J-	NA	NA	NA	NA
Arsenic	MG/KG	13	16	4.8 J-	6.2 J-	5.7 J-	5.8 J-	6.9 J-
Barium	MG/KG	350	400	97.6	NA	NA	NA	NA
Beryllium	MG/KG	7.2	590	0.80	NA	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	0.58	NA	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	4,200	NA	NA	NA	NA
Chromium	MG/KG	30	1500	22.4	NA	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	11.6	NA	NA	NA	NA
Copper	MG/KG	50	270	29.8	NA	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	23,900	NA	NA	NA	NA
Lead	MG/KG	63	1000	40.7 J-	80.9 J-	43.9 J-	43.1	422
Magnesium	MG/KG	-	-	3,800	NA	NA	NA	NA
Manganese	MG/KG	1600	10000	496	NA	NA	NA	NA
Mercury	MG/KG	0.18	2.8	0.058	NA	NA	NA	NA
Nickel	MG/KG	30	310	34.6	NA	NA	NA	NA
Potassium	MG/KG	-	-	2,780	NA	NA	NA	NA
Sodium	MG/KG	-	-	69.9 J	NA	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	28.4	NA	NA	NA	NA
Zinc	MG/KG	109	10000	139	NA	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

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[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

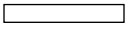
Location ID				TS-7H	TS-8A	TS-8B	TS-8B	TS-8C
Sample ID				TS-7H	TS-8A	FD-040119-1	TS-8B	TS-8C
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/29/19	04/01/19	04/01/19	04/01/19	04/01/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**			Field Duplicate (1-1)		
Metals								
Aluminum	MG/KG	10000 CP-51	-	NA	NA	17,600 J-	22,100 J-	NA
Antimony	MG/KG	12 CP-51	-	NA	NA	0.80 J	0.93 J	NA
Arsenic	MG/KG	13	16	6.9 J-	5.3	7.9	10.6	11.3
Barium	MG/KG	350	400	NA	NA	84.8	108	NA
Beryllium	MG/KG	7.2	590	NA	NA	0.87 J+	1.1 J+	NA
Cadmium	MG/KG	2.5	9.3	NA	NA	0.34	0.23 J	NA
Calcium	MG/KG	10000 CP-51	-	NA	NA	9,100	5,690	NA
Chromium	MG/KG	30	1500	NA	NA	23.6	28.4	NA
Cobalt	MG/KG	20 CP-51	-	NA	NA	12.8	14.6	NA
Copper	MG/KG	50	270	NA	NA	28.1	33.3	NA
Iron	MG/KG	2000 CP-51	-	NA	NA	27,200	32,800	NA
Lead	MG/KG	63	1000	107	21.4	32.7	26.8	24.3
Magnesium	MG/KG	-	-	NA	NA	7,730	7,180	NA
Manganese	MG/KG	1600	10000	NA	NA	426	399	NA
Mercury	MG/KG	0.18	2.8	NA	NA	0.033	0.023 J	NA
Nickel	MG/KG	30	310	NA	NA	34.0	40.8	NA
Potassium	MG/KG	-	-	NA	NA	3,830 J+	4,170 J+	NA
Sodium	MG/KG	-	-	NA	NA	119 J	130 J	NA
Vanadium	MG/KG	39 CP-51	-	NA	NA	34.7 J-	43.0 J-	NA
Zinc	MG/KG	109	10000	NA	NA	98.6	96.0	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.


Concentration Exceeds Criteria (1)


Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

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J- = The reported concentration is an estimated value biased low. J+ = The reported concentration is an estimated value biased high.

Only Detected Results Reported.

Advanced Selection: Soils Met 2019
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Printed: 5/16/2019 11:04:12 AM
[MATRIX] = 'SO' AND [PRCCODE] = 'MET' AND [LOCID] <> 'TS-1-8 COMP' AND ([SACODE] = 'N' OR [SACODE] = 'FD')

TABLE 2-2
RI SOIL ANALYTICAL DATA - INCINERATOR AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-8D	TS-8E	TS-8F
Sample ID				TS-8D	TS-8E	TS-8F
Matrix				Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				04/01/19	04/01/19	04/01/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**			
Metals						
Aluminum	MG/KG	10000 CP-51	-	NA	NA	NA
Antimony	MG/KG	12 CP-51	-	NA	NA	NA
Arsenic	MG/KG	13	16	10.4	6.1	6.9
Barium	MG/KG	350	400	NA	NA	NA
Beryllium	MG/KG	7.2	590	NA	NA	NA
Cadmium	MG/KG	2.5	9.3	NA	NA	NA
Calcium	MG/KG	10000 CP-51	-	NA	NA	NA
Chromium	MG/KG	30	1500	NA	NA	NA
Cobalt	MG/KG	20 CP-51	-	NA	NA	NA
Copper	MG/KG	50	270	NA	NA	NA
Iron	MG/KG	2000 CP-51	-	NA	NA	NA
Lead	MG/KG	63	1000	30.5	13.8	26.9
Magnesium	MG/KG	-	-	NA	NA	NA
Manganese	MG/KG	1600	10000	NA	NA	NA
Mercury	MG/KG	0.18	2.8	NA	NA	NA
Nickel	MG/KG	30	310	NA	NA	NA
Potassium	MG/KG	-	-	NA	NA	NA
Sodium	MG/KG	-	-	NA	NA	NA
Vanadium	MG/KG	39 CP-51	-	NA	NA	NA
Zinc	MG/KG	109	10000	NA	NA	NA

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

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J- = The reported concentration is an estimated value biased low. J+ = The reported concentration is an estimated value biased high.

Only Detected Results Reported.

TABLE 2-3
RI SOIL ANALYTICAL DATA - SMOKES CREEK AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-1F	TS-2F	TS-3D	TS-4E	TS-5E
Sample ID				TS-1F	TS-2F	TS-3D	TS-4E	TS-5E
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/26/19	03/26/19	03/27/19	03/27/19	03/28/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Volatile Organic Compounds								
Chloroform	MG/KG	0.37	350		0.00054 J		0.00044 J	
Methylene chloride	MG/KG	0.05	500					
Semivolatile Organic Compounds								
Acenaphthylene	MG/KG	100	500		0.040 J			
Benzo(a)anthracene	MG/KG	1	5.6	0.22 J	0.18 J		0.13 J	
Benzo(a)pyrene	MG/KG	1	1	0.26 J	0.22	0.031 J	0.15 J	
Benzo(b)fluoranthene	MG/KG	1	5.6	0.30 J	0.34		0.20 J	
Benzo(g,h,i)perylene	MG/KG	100	500	0.27 J	0.25		0.13 J	
Benzo(k)fluoranthene	MG/KG	0.8	56	0.15 J	0.13 J		0.087 J	
bis(2-Ethylhexyl)phthalate	MG/KG	50 CP-51	-		0.079 J			
Carbazole	MG/KG	-	-		0.041 J			
Chrysene	MG/KG	1	56	0.29 J	0.25		0.16 J	
Dibenz(a,h)anthracene	MG/KG	0.33	0.56		0.076 J		0.055 J	
Fluoranthene	MG/KG	100	500	0.53 J	0.39	0.071 J	0.28	0.060 J
Indeno(1,2,3-cd)pyrene	MG/KG	0.5	5.6	0.13 J	0.18 J		0.11 J	
Phenanthrene	MG/KG	100	500	0.18 J	0.15 J		0.11 J	
Pyrene	MG/KG	100	500	0.32 J	0.32		0.21 J	
Pesticide Organic Compounds								
4,4'-DDE	MG/KG	0.0033	62	0.0029 J	0.0052 J		0.0033	
4,4'-DDT	MG/KG	0.0033	47	0.0013 J	0.0030	0.00068 J		

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

Empty cell = Not Detected, NA = Not Analyzed

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Only Detected Results Reported.

TABLE 2-3
RI SOIL ANALYTICAL DATA - SMOKES CREEK AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-1F	TS-2F	TS-3D	TS-4E	TS-5E
Sample ID				TS-1F	TS-2F	TS-3D	TS-4E	TS-5E
Matrix				Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/26/19	03/26/19	03/27/19	03/27/19	03/28/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**					
Pesticide Organic Compounds								
alpha-BHC	MG/KG	0.02	3.4					
beta-Chlordane	MG/KG	-	-					
delta-BHC	MG/KG	0.04	500		0.00061 J			
gamma-BHC (Lindane)	MG/KG	0.1	9.2			0.00059 J		

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

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Concentration Exceeds Criteria (1)

Concentration Exceeds Criteria (2)

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TABLE 2-3
RI SOIL ANALYTICAL DATA - SMOKES CREEK AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-6D	TS-7C	TS-8B	TS-8B
Sample ID				TS-6D	TS-7C	FD-040119-1	TS-8B
Matrix				Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/29/19	03/29/19	04/01/19	04/01/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**			Field Duplicate (1-1)	
Volatile Organic Compounds							
Chloroform	MG/KG	0.37	350				
Methylene chloride	MG/KG	0.05	500			0.0031 J	0.0034 J
Semivolatile Organic Compounds							
Acenaphthylene	MG/KG	100	500				
Benzo(a)anthracene	MG/KG	1	5.6	0.034 J	0.049 J		0.082 J
Benzo(a)pyrene	MG/KG	1	1	0.039 J	0.056 J		0.082 J
Benzo(b)fluoranthene	MG/KG	1	5.6	0.042 J	0.060 J		
Benzo(g,h,i)perylene	MG/KG	100	500	0.034 J	0.050 J		0.072 J
Benzo(k)fluoranthene	MG/KG	0.8	56	0.028 J	0.044 J		0.058 J
bis(2-Ethylhexyl)phthalate	MG/KG	50 CP-51	-				
Carbazole	MG/KG	-	-				
Chrysene	MG/KG	1	56		0.060 J		
Dibenz(a,h)anthracene	MG/KG	0.33	0.56				
Fluoranthene	MG/KG	100	500	0.089 J	0.12 J		0.18 J
Indeno(1,2,3-cd)pyrene	MG/KG	0.5	5.6		0.031 J		
Phenanthrene	MG/KG	100	500	0.031 J	0.049 J		0.082 J
Pyrene	MG/KG	100	500	0.049 J	0.075 J		
Pesticide Organic Compounds							
4,4'-DDE	MG/KG	0.0033	62				
4,4'-DDT	MG/KG	0.0033	47		0.0011 J		

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

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Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

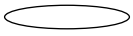
TABLE 2-3
RI SOIL ANALYTICAL DATA - SMOKES CREEK AREA
UNRESTRICTED AND COMMERCIAL USE CRITERIA
LACKAWANNA INCINERATOR SITE

Location ID				TS-6D	TS-7C	TS-8B	TS-8B
Sample ID				TS-6D	TS-7C	FD-040119-1	TS-8B
Matrix				Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Date Sampled				03/29/19	03/29/19	04/01/19	04/01/19
Parameter	**Units**	**Criteria (1)**	**Criteria (2)**			Field Duplicate (1-1)	
Pesticide Organic Compounds							
alpha-BHC	MG/KG	0.02	3.4	0.00065 J			
beta-Chlordane	MG/KG	-	-	0.00088 J			
delta-BHC	MG/KG	0.04	500				
gamma-BHC (Lindane)	MG/KG	0.1	9.2				

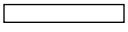
Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, plus CP-51 Table 1 10/21/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Protection of Public Health, Commercial, plus CP-51 Table 1 10/21/10.

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria (1)



Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix D) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the ROD to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to commercial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP, and in accordance with the Health and Safety Plan (Appendix E). ICs identified

in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 3-1. These ICs are:

- The property may be used for: commercial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 3-1, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Cover (or Cap)

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system in the incinerator area is comprised of existing structures, such as buildings, or a minimum of 12 inches of clean soil. The cover system in the Smokes Creek Corridor area is comprised of a minimum of 24 inches of clean soil on the embankment slope, and 12 inches of clean soil or asphalt cover in the flat area on top of the creek embankment. Figure 3-1 presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in Appendix D outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix E. Any disturbance of the site's cover system must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

3.3.2.1 - Cover (or Cap)

The composite cover system is a permanent control, and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.2.2 - Monitoring Wells

Groundwater monitoring activities will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in Appendix F.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-Wide Inspection

Site-wide inspections will be performed at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e., no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix G – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;

- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 4-1 – Post Remediation Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4-1 – Post Remediation Sampling Requirements and Schedule

	Analytical Parameters		Schedule
Sampling Location	TAL Metals (EPA Method 6010B)	pH (EPA Method 9040)	
Monitoring Wells	X	X	Annually

Detailed sample collection and analytical procedures and protocols are provided in Appendix H – Field Activities Plan and Appendix F – Quality Assurance Project Plan.

4.3.1 Groundwater Sampling

Groundwater monitoring will be performed annually as part of the SMP for the Site to assess the natural attenuation of TAL metals. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site.

Table 4-2 summarizes the well identification numbers, as well as the purpose, location, depth, diameter and screened intervals of the wells. As part of the groundwater monitoring, wells are sampled to evaluate the effectiveness of the remedial system. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 4-2 – Monitoring Well Construction Details

Monitoring Well ID	Well Type	Coordinates (Northing/ Easting)	Well Diameter (inches)	Elevation (feet above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-02A	Overburden - PVC	1084753.7 1027450.4	2	598.19	595.70	575.7	565.7
MW-03A	Overburden – PVC	1084602.8 1027162.3	2	596.14	596.40	576.4	566.4
MW-04	Overburden – PVC	1084710.8 1026893.5	2	596.22	596.45	576.45	566.45
MW-06	Overburden – PVC	1084566.4 1027339.1	2	594.80	595.07	575.07	565.07
MW-07	Overburden – PVC	1084651.7 1027450.3	2	595.15	595.41	578.41	568.41
MW-08	Overburden - PVC	1084456.2 1027476.6	2	593.42	593.56	581.56	571.56

Monitoring well construction logs are included in Appendix C of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or

decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.3.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix G - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Activities Plan provided as Appendix H of this document.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

Maintenance of the soil cover system will include seasonal mowing and an annual inspection of the cover system, vegetation cover and signs of erosion. Mowing will be conducted in mid-late summer to avoid the spring peak pollination time period. The property owner is also encouraged to plant native wildflower seeds in un-mowed areas to maintain vegetative cover for additional erosion control measures.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

The Corridor Area of the Site is within the 100-year floodplain of Smokes Creek. Due to climate change, instances of flooding at the Site may increase in severity. Sloped areas of the cover system could be impacted by severe rain events and will have an increased susceptibility to erosion. The cover system at the site will be monitored periodically and repaired if erosion should occur. Additionally, there are two drainage structures in the Incinerator Area North of the ramp. There are many drainage structures in the Corridor Area. These are located in low area of the site and would be susceptible to flooding if the inlets became clogged. Annual inspections of these structures will be required.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site

management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

- Waste Generation – Waste generation during future remedial excavation work will be properly characterized and disposed of at the nearest disposal facility available to limit resulting vehicle emissions.
- Energy usage – There are no active remediation systems at the site, therefore no substantial energy usage is required during site management.
- Emissions – limited emissions will be generated via fuel usage for mowing and maintenance of the vegetative covers, and transportation to and from the Site for cover inspections. In the case of potential future remedial excavations, waste generated will be disposed of at the nearest disposal facility available to limit resulting vehicle emissions.
- Water usage – No water usage is necessary for the site.
- Land and/or ecosystems – No further active remediation is currently occurring at the site. Therefore, there are no expected disturbances of land and/ or ecosystems during site management.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate, e.g., during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct inspections and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. Site inspections and sampling will be done concurrently. Local laboratories will be utilized to the extent practicable.

6.2.3 Metrics and Reporting

Because no further active remediation is currently occurring at the site, reporting is not necessary for waste generation, energy usage, emissions, water usage, or land and/or ecosystems.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. The responsibilities of the owners and remedial party are presented in Appendix I. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;

- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix G. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 7-1 and summarized in the Periodic Review Report.

Table 7-1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Site Inspection	Annually
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);

- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air);

- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);

- Sampling results in comparison to appropriate standards/criteria;

- A figure illustrating sample type and sampling locations;

- Copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);

- Any observations, conclusions, or recommendations; and

- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;

- Name, company, and position of person(s) conducting maintenance activities;

- Description of maintenance activities performed;

- Any modifications to the system;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and

- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;

- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;

- Description of non-routine activities performed;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and

- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) months after the NYSDEC approves this SMP. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually or to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix A -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.

- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.

- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:

  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;

  - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;

  - O&M data summary tables;

  - A current plume map for sites with remaining groundwater contamination; and

  - A groundwater elevation contour map for each gauging event.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  - The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;

  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

  - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative] for the site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

7.4 Remedial Site Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. The RSO

report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

8.0 REFERENCES

EA Engineering, P.C. (EA) 2017. *FINAL Remedial Investigation Report, Former Lackawanna Incinerator Site (915206) Erie County, Lackawanna New York*. October.

EA Engineering, P.C. (EA) 2015. *Interim Remedial Measure Construction Completion Report, Former Lackawanna Incinerator Site (915206) Erie County, Lackawanna New York.* September.

EA Engineering, P.C. (EA) 2015. *FINAL Feasibility Study Report, Lackawanna Incinerator Site (915206) Erie County, Lackawanna New York.* November.

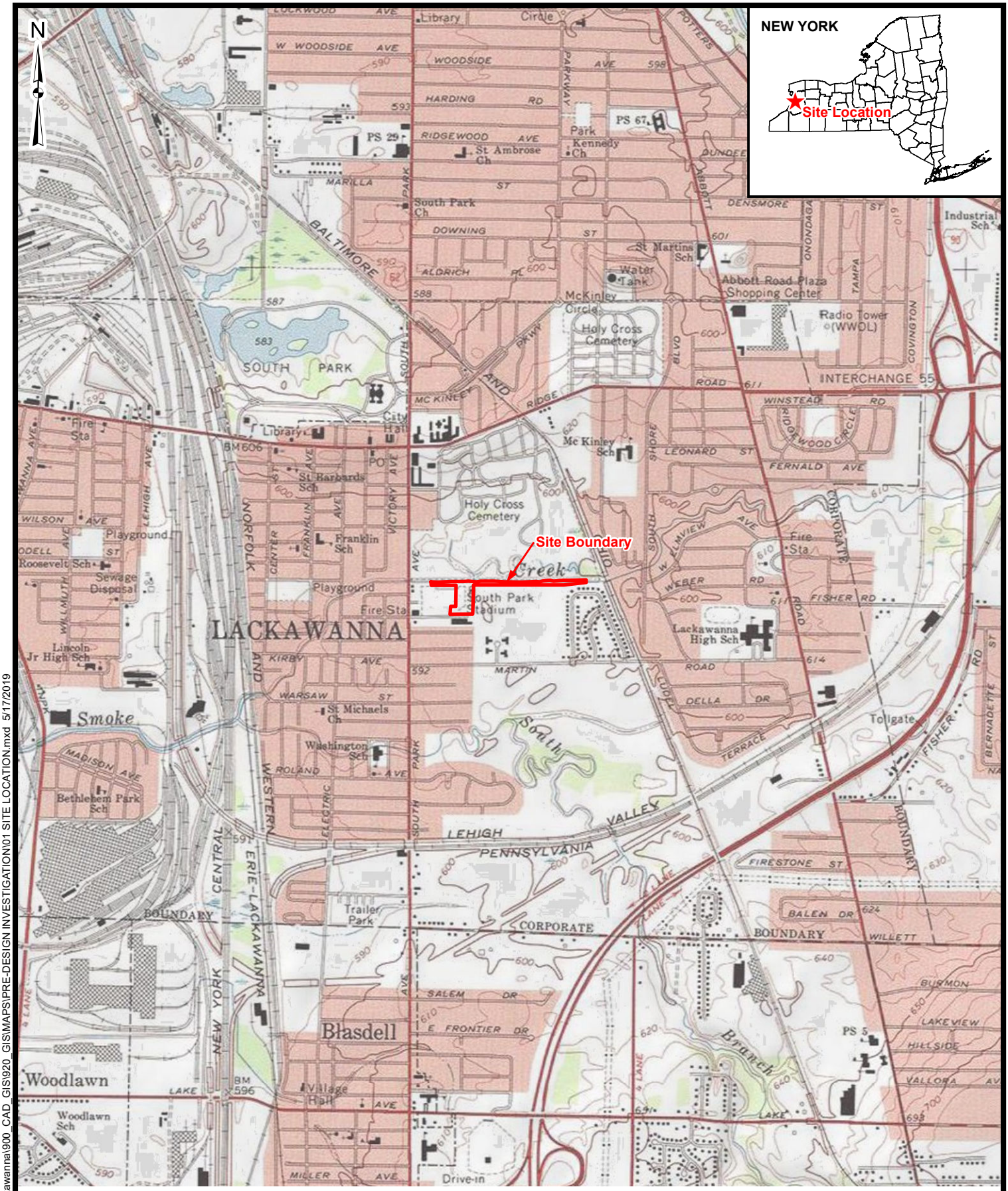
6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

NYSDEC. June 2017. Record of Decision, Lackawanna Incinerator Site State Superfund Project Lackawanna, Erie County Site No. 915206

URS Corporation – New York. December 2019. Basis of Design and Pre-Design Investigation Report. Lackawanna Incinerator Site No. 915206



Sources: USGS 1:24,000-scale topographic map, 7.5 x 7.5 Minute Quadrangle: Buffalo SE, 1965

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LACKAWANNA INCINERATOR SITE
SITE MANAGEMENT PLAN
SITE LOCATION MAP

FIGURE 1-1

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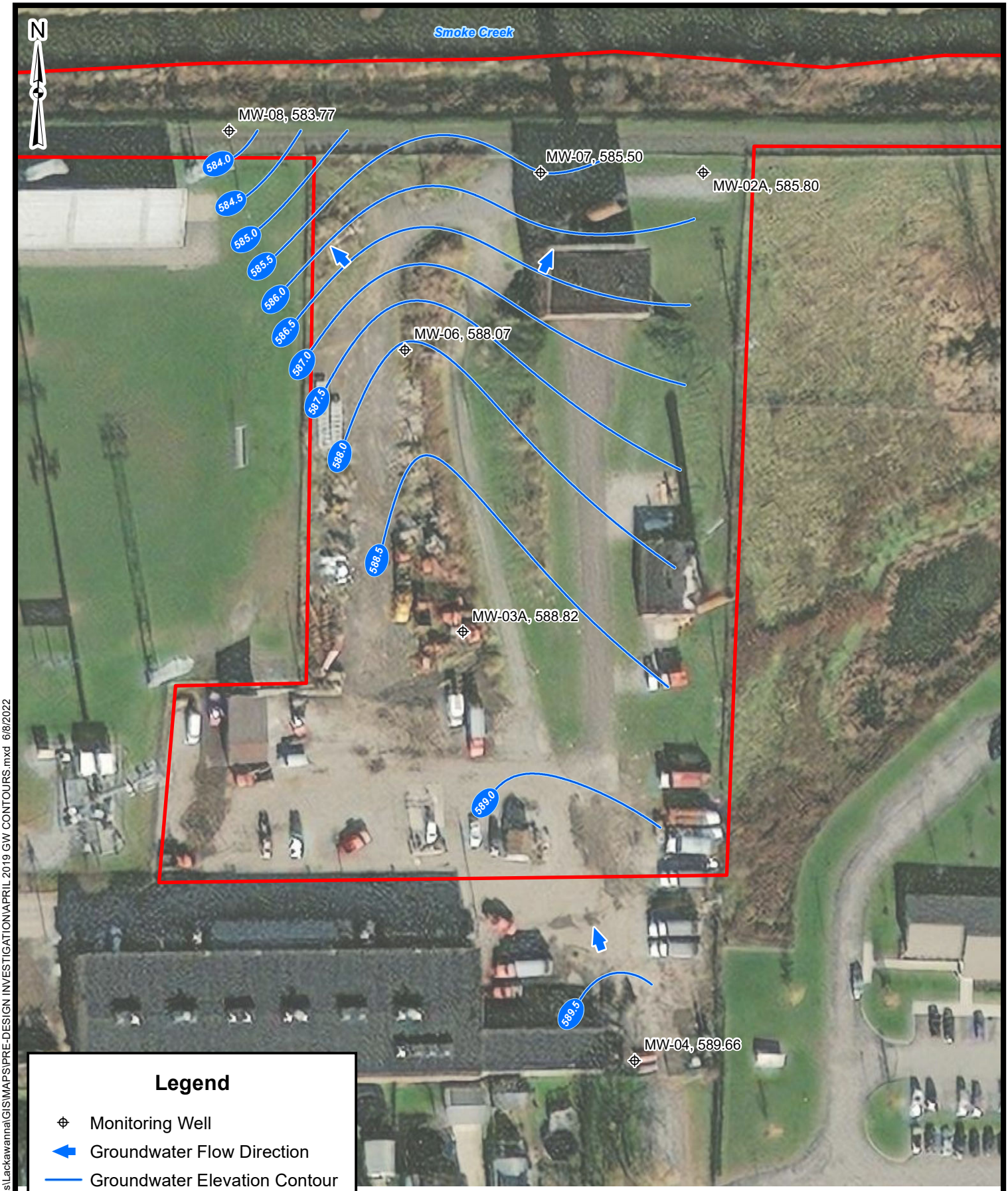
LACKAWANNA INCINERATOR SITE
PRE-DESIGN INVESTIGATION
SITE PLAN AND BOUNDARY MAP

FIGURE 1-2



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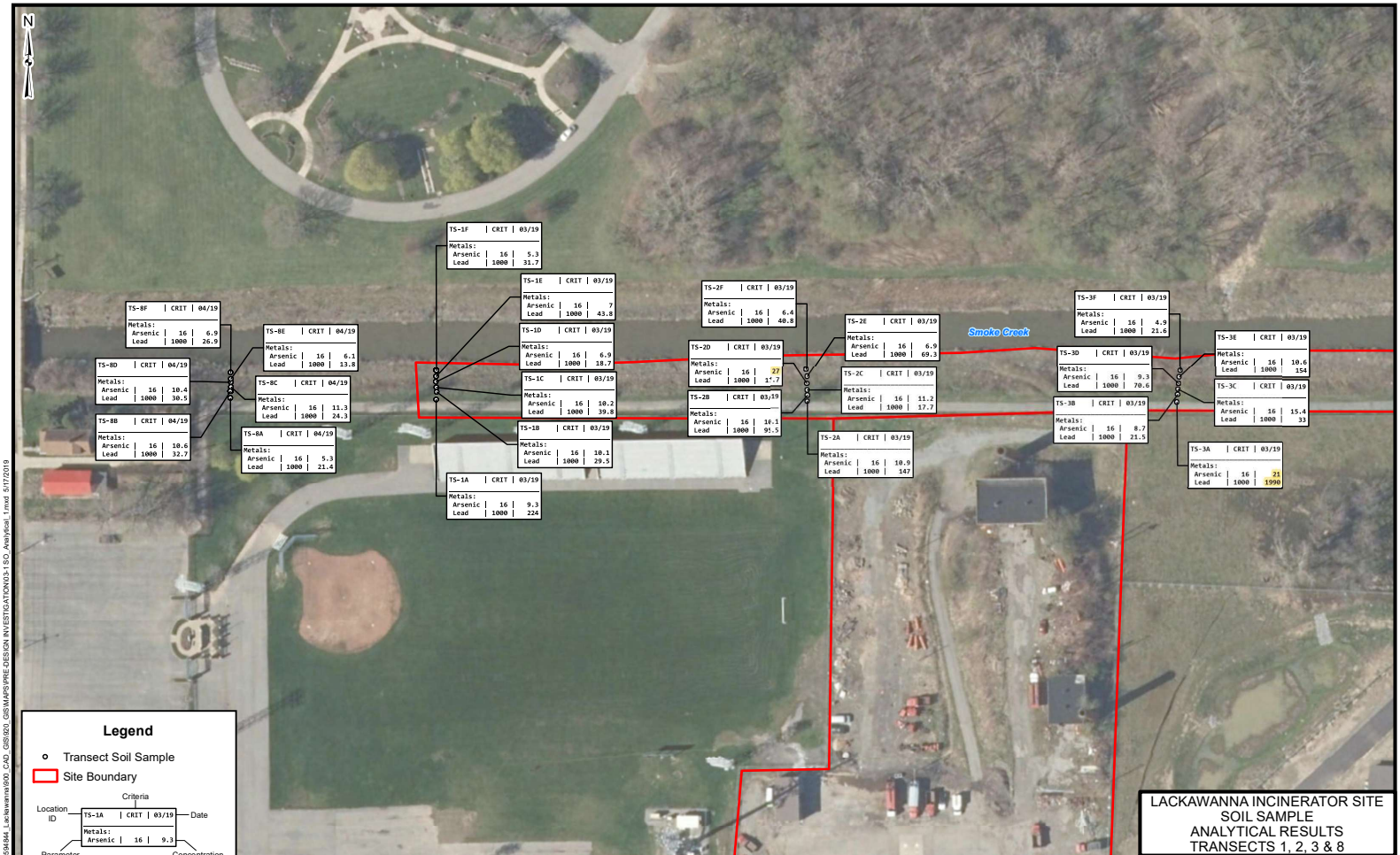
LACKAWANNA INCINERATOR SITE
GROUNDWATER ELEVATION CONTOURS
APRIL 2019

FIGURE 2-1



Source: ESRI World Imagery
Criteria: 6NYCRR Subpart 375 Commercial Use Criteria CP-51

LACKAWANNA INCINERATOR SITE
SOIL SAMPLE
ANALYTICAL RESULTS
TRANSECTS 1, 2, 3 & 8

AECOM

FIGURE 2-2

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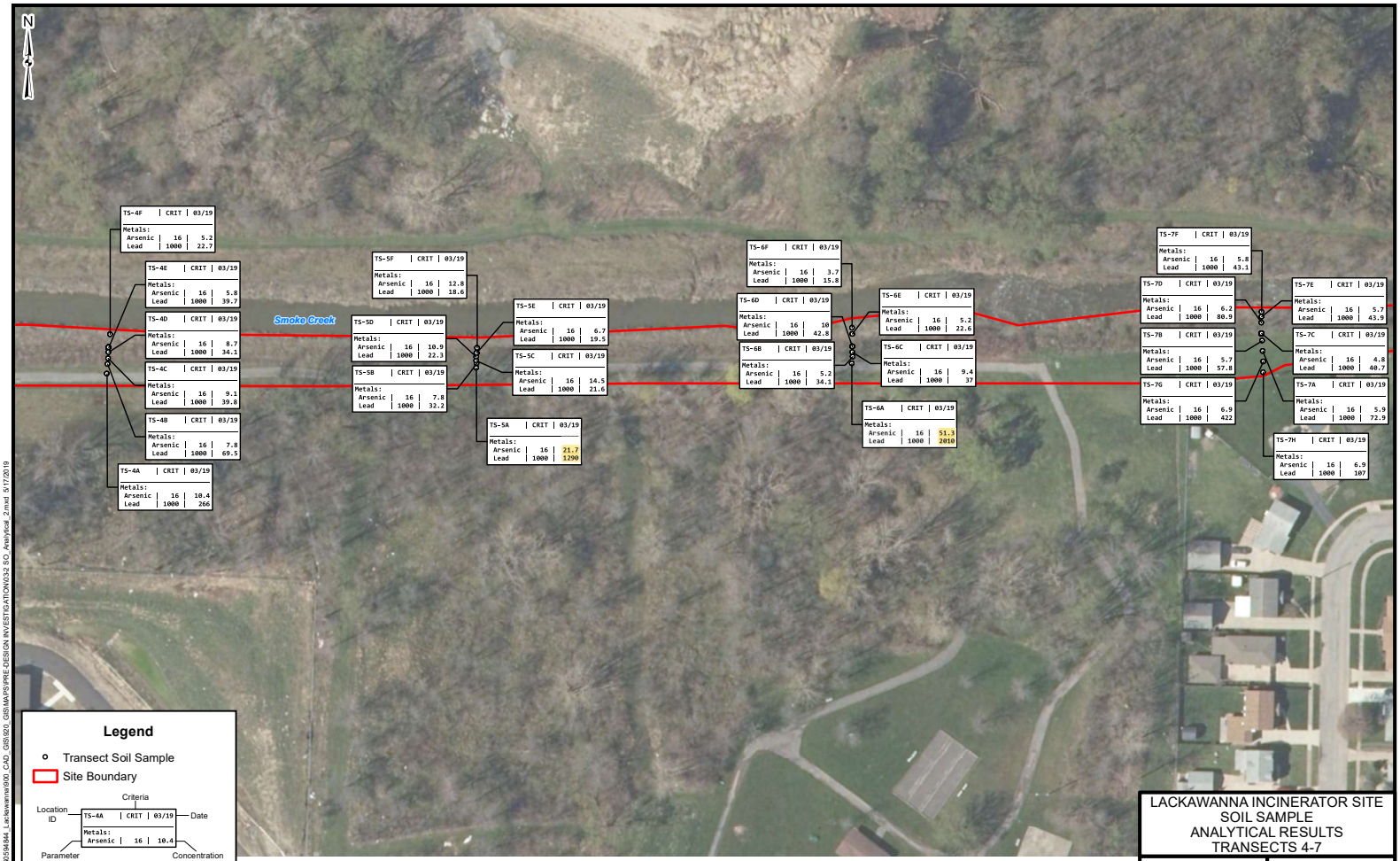

Source: ESRI World Imagery
Criteria: 6NYCRR Subpart 375 Commercial Use Criteria CP-51

LACKAWANNA INCINERATOR SITE
SOIL SAMPLE
ANALYTICAL RESULTS
TRANSECTS 4-7

AECOM

FIGURE 2-3

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MW-02A	2-3'	6-7'	8-10'
Arsenic	28	13	14
Barium	900	99	76
Cadmium	6.6	0.720 U	0.710 U
Copper	650	33	30
Cyanide	66	NA	NA
Lead	1,500 J	19 J	16 J
Nickel	130	37	32

SB-13	4-8'	8-10'	10-12'	12-14'	16-18'	20-22'	23-25'
Arsenic	19.7	9.06	21.5	10.2	11.8	51.5	6.23
Barium	584 J	106 J	397 J	88.3 J	281 J	1,500 J	76.3 J
Cadmium	42.7	1.33	17.1	1.62	3.98	19.5	0.97
Copper	309 J	32.2 J	684 J	28.6 J	178 J	1,510 J	21 J
Cyanide	NA	0.197 J	NA	NA	NA	0.711	NA
Lead	5,470	43.9	2,040	35.5	789	6,820	20.3
Nickel	147	41.8	342	50.2	50.7	59	38.3

SB-14	0-2'	4-6'	6-8'	8-10'	10-12'
Arsenic	7.65 J	8.98 J	4.75 J	7.5 J	7.83 J
Barium	50.7 J	72.3 J	50.9 J	80.5 J	73 J
Cadmium	0.740 J	1.29	1.03	1.2	1.34
Copper	25.2 J	22.4 J	27.1 J	23 J	23.2 J
Cyanide	0.292 U	NA	NA	NA	NA
Lead	34.1	22.9	19.8	23.3	23.3
Nickel	33.7	40.9	41.9	44.8	44.3

SB-12	0-2'	8-10'	10-12'	12-14'	14-16'	16-18
Arsenic	6.57 J	8.13 J	10.5 J	11.5 J	9.48 J	10.4 J
Barium	73.5 J	173 J	101 J	73 J	145 J	113 J
Cadmium	0.660 J	1.95	1.68	1.45	4.42	1.73
Copper	20.7 J	63.5 J	30.2 J	23.8 J	67.2 J	27.8 J
Cyanide	0.342	NA	NA	NA	NA	NA
Lead	66.7 J	464	51.9	25.4	810	112
Nickel	22.3 J	35.8	44.2	43.9	36.3	43.4

SB-11	0-2'	2-4'	4-6'	6-8'	8-10'	10-12'	12-14'	14-16'	16-18
Arsenic	8.85 J	7.54 J	8.49 J	6.1 J	8.27 J	11.3 J	14.4 J	7.23 J	9.07 J
Barium	96.4	333	109	195	120	288	588	74.6	72.6
Cadmium	0.78	2.57	0.76	1.97	1.13	1.55	3.73	0.47	0.68
Copper	16.9 J	58.3 J	64 J	38.4 J	24.7 J	107 J	139 J	23.6 J	21.7 J
Cyanide	NA	NA	0.152 J	NA	NA	NA	NA	NA	NA
Lead	26.7 J	630 J	246 J	266 J	901 J	421 J	4,120 J	25.3 J	23.6 J
Nickel	38.4 J	38.2 J	30.7 J	34.6 J	41.1 J	38.6 J	41.3 J	47.8 J	39 J

Legend

A Monitoring Well

R Soil Boring

Site Boundary

NOTE:
Soil analytical results compared to 6 New York Code of Rules and Regulations (NYCRR) Part 375 Environmental Remediation Programs Soil Cleanup Objectives (SCOs).

On-Site results compared to Unrestricted Use and Commerical SCOs. Only locations with results exceeding SCOs are shown. Exceedances of Unrestricted Use are bolded. Exceedances of Commericial SCOs are shaded in gray.

Sources:
Feasibility Study Report, EA Engineering, Science, and Technology Inc., November 2015
ESRI World Imagery

50 0 50 Feet

LACKAWANNA INCINERATOR SITE
POST EXCAVATION
REMAINING SOIL CONTAMINANTION
INCINERATOR AREA

AECOM

FIGURE 2-4

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SB-35	1-2'	2-3'
Arsenic	28.0	42.3
Barium	468 J	1,050 J
Cadmium	15.4 J	11.9 J
Copper	447 J	1,030 J
Lead	1,370	892

SB-19	2-4'
Arsenic	48.2 J
Barium	461
Cadmium	5.88 J
Copper	854 J
Lead	818

SB-43	1-2'
Arsenic	9.72 JD
Barium	509 D
Cadmium	2.14 JD
Copper	173 D
Lead	976 D

SB-51	1-2'
Arsenic	10.50
Barium	125
Cadmium	2.66
Copper	25.8
Lead	79.6

SB-54	1-2'
Arsenic	34.8
Barium	598
Cadmium	57.5
Copper	1,470
Lead	3,340

SB-34	1-2'
Arsenic	11.2
Barium	249 J
Cadmium	3.75 J
Copper	103 J
Lead	356

MW-08	0-2'	2-4'
Arsenic	18.0	80.0
Barium	250	8,800
Cadmium	1.90	5.50
Copper	130 J	410 J
Lead	320 J	790 J

SB-50	1-2'
Arsenic	6.83
Barium	116
Cadmium	1.85
Copper	10.2
Lead	63.3

SB-53	1-2'
Arsenic	37.6
Barium	411
Cadmium	17.5
Copper	394
Lead	1,170

Smoke Creek

Reddon St

Hamilton Ave

St George Ave

Legend

- A Monitoring Well
- R Soil Boring
- Site Boundary

NOTE:
Soil analytical results compared to 6 New York Code of Rules and Regulations (NYCRR) Part 375 Environmental Remediation Programs Soil Cleanup Objectives (SCOs).

On-Site results compared to Unrestricted Use and Commerical SCOs. Only locations with results exceeding SCOs are shown. Exceedances of Unrestricted Use are bolded. Exceedances of Commericial SCOs are shaded in gray.

Sources:
Feasibility Study Report, EA Engineering, Science, and Technology Inc., November 2015
ESRI World Imagery

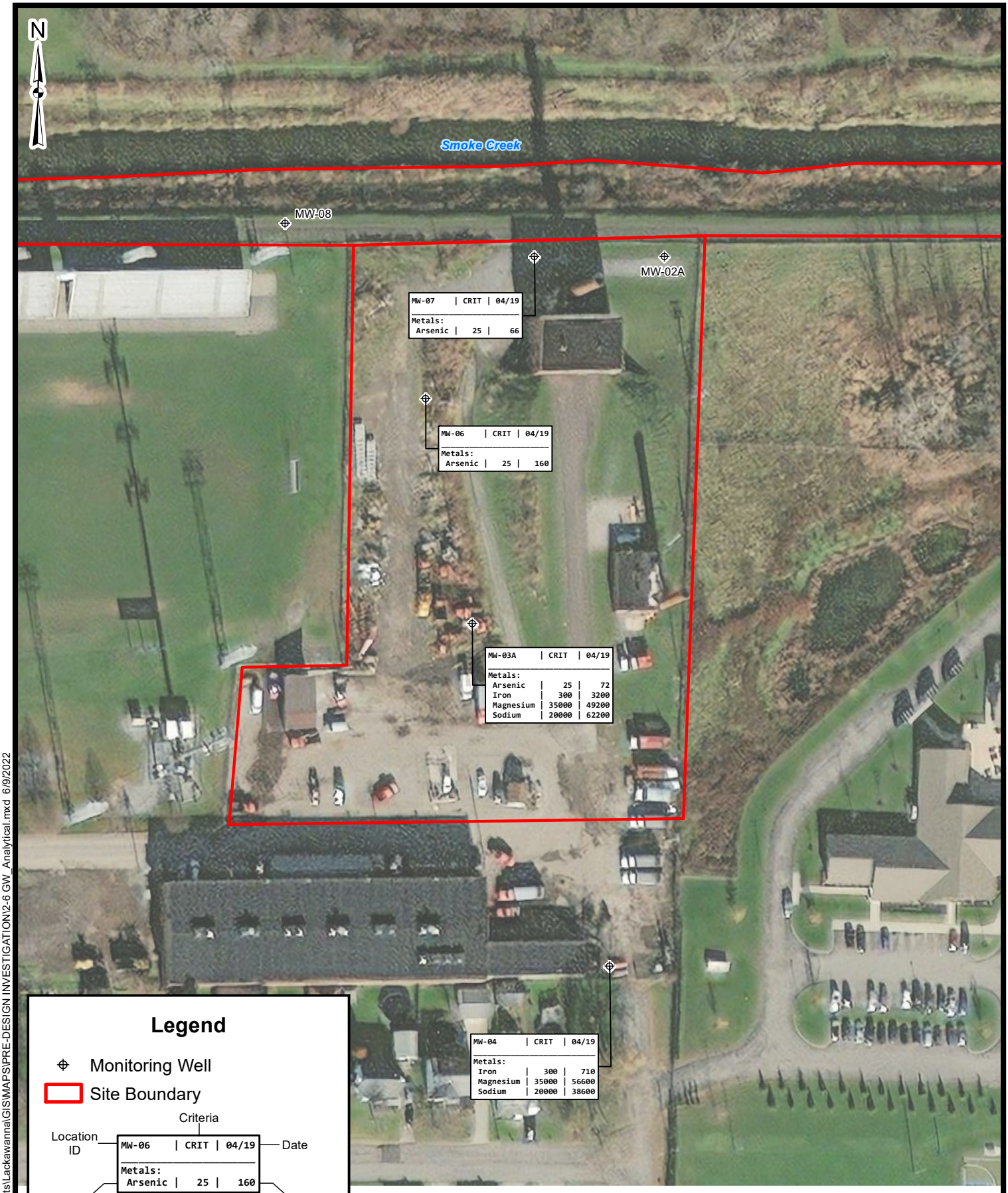
150 0 150 Feet

LACKAWANNA INCINERATOR SITE
POST EXCAVATION
REMAINING SOIL CONTAMINANTION
SMOKE CREEK AREA

AECOM

FIGURE 2-5

C:\Users\maxwell.reis\Documents\Lackawanna\GIS\MAPS\PRE-DESIGN INVESTIGATION\2-3 Remaining_Soil_Contamination_SmokeCreekArea.mxd 6/9/2022



Sources: ESRI World Imagery
Criteria: TOGS 1.1.1, Class GA
Note: Only results that exceed the criteria are shown.

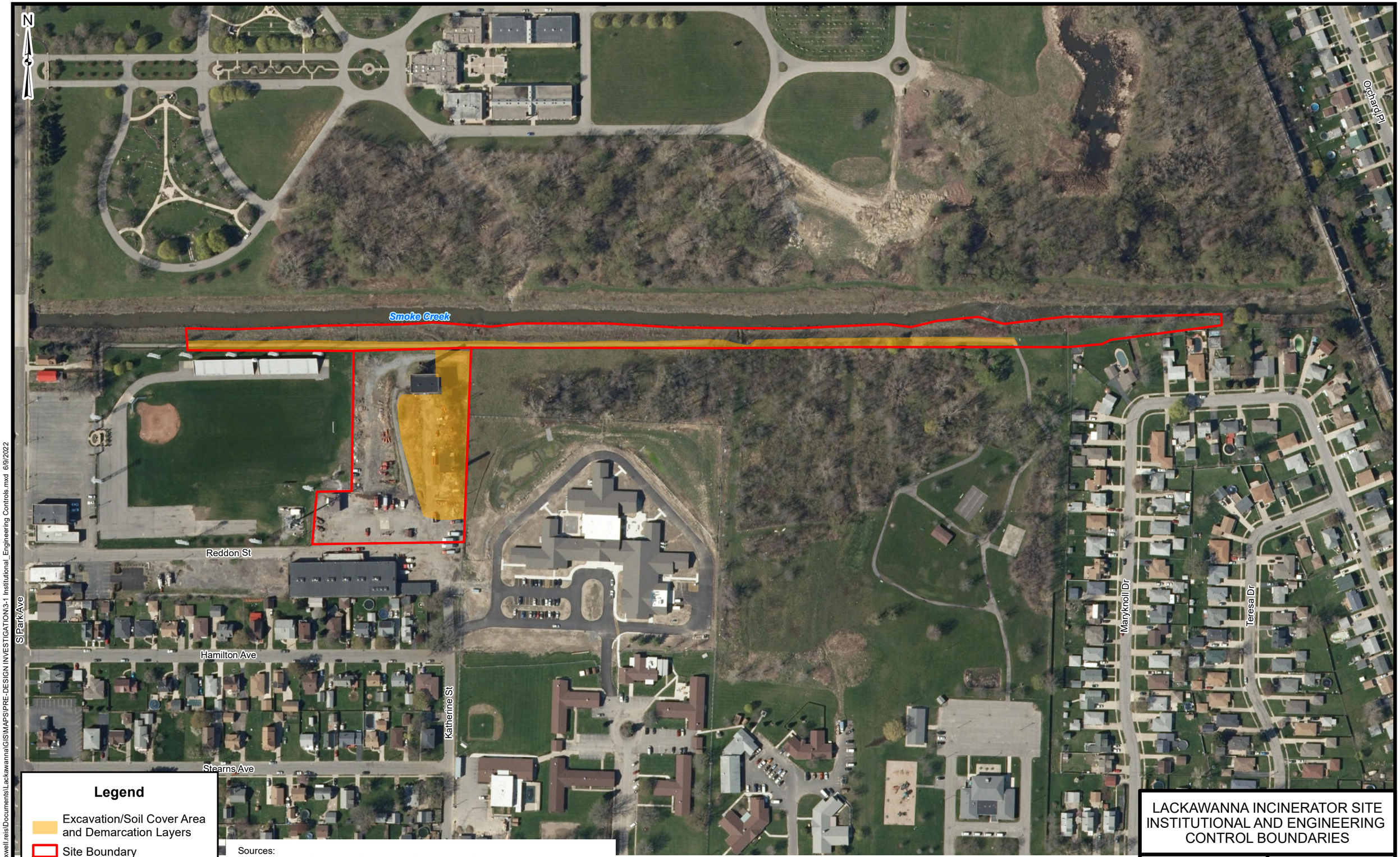
80 0 80 Feet

AECOM

LACKAWANNA INCINERATOR SITE
GROUNDWATER ANALYTICAL RESULTS

FIGURE 2-6

C:\Users\maxwell.reis\Documents\Lackawanna\GIS\MAPS\PRE-DESIGN INVESTIGATION\2-6 GW_Analytical.mxd 6/9/2022



LACKAWANNA INCINERATOR SITE
INSTITUTIONAL AND ENGINEERING CONTROL BOUNDARIES

AECOM

FIGURE 3-1

C:\Users\maxwell.reis\Documents\Lackawanna\GIS\MAPS\PRE-DESIGN INVESTIGATION\3-1 Institutional_Engineering Controls.mxd 6/9/2022

APPENDIX A – ENVIRONMENTAL EASEMENT

TO BE ADDED WHEN COMPLETE

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
City of Lackawanna – Mr. Richard Juda, Jr. - City Attorney	716.827.6479 cityattorney@lackny.com
NYSDEC DER Region 9 RHWRE -- Andrea Caprio	716.851.7220 Andrea.Caprio@dec.ny.gov
NYSDEC DER Region 9 RHWRE -- Stanley Radon	(716)851-7220 stanley.radon@dec.ny.gov
NYSDEC DER Project Manager – Evelyn Hussey	518.402.6787 Evelyn.Hussey@dec.ny.gov
NYSDEC DER Project Manager's Supervisor – Sarah Saucier	518.402.9675 Sarah.Saucier@dec.ny.gov
NYSDEC DER Site Control -- Leonard Zinoman,	(518) 402-9553 leonard.zinoman@dec.ny.gov
NYSDOH Project Manager -- Daniel Tucholski	518-486-7016 Daniel.Tucholski@health.ny.gov

APPENDIX C – MONITORING WELL BORING AND CONSTRUCTION LOGS

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027406.486 Easting: 1084478.181
Surface Elevation: 595.0408
Casing Below Surface: N/A
Reference Elevation: 595.0408
Reference Description: Surface Elevation

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-05
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-26-12	DATE: 10-26-12
Date:					TIME: 08:15	TIME: 08:27

Surface Conditions: Athletic Field (Grass, Topsoil)
Weather: Sunny, 5-10 mph S
Temperature: 67F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.0	0	OL	0.0': Topsoil: Dark Brown, SILT and CLAY, some f. Sand, tr. Organic Matter, medium stiff, moist.
					OL	0.2' - 4.0': Light Brown, SILT and CLAY, tr. f. Sand, tr. Organic Matter, hard, moist.
			3.3	1		
			3.9	2		
			2.0	3		
	4/4		2.3	4	OH	4.0' - 8.0': Reddish Brown, CLAY, tr. Silt, tr. Organic Matter, hard, moist.
			5.7	5		
			4.8	6		
			4.7	7		
				8		EOB @ 8.0-ft bgs
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-26-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027291.353 Easting: 1084476.187
Surface Elevation: 595.6351
Casing Below Surface: N/A
Reference Elevation: 595.6351
Reference Description: Surface Elevation

Job. No.	Client:	Location:
1490710	Project: Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-06
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-26-12	DATE: 10-26-12
Date:					TIME: 07:52	TIME: 08:00

Surface Conditions: Athletic Field (Grass, Topsoil)
Weather: Sunny, 5-10 mph S
Temperature: 67F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.8	0	OL	0.0': Topsoil: Dark Brown, SILT and CLAY, some f. Sand, tr. Organic Matter, medium stiff, moist.
					OL	0.2' - 2.0': Light Brown, SILT and CLAY, tr. f. Sand, hard, moist.
			1.1	1		
			2.7	2	SM	2.0' - 2.5': Light Brown, f. SAND, some Silt.
					OL	2.5' - 4.0': Light Brown, SILT and CLAY, tr. Organic Matter, hard, moist.
			0.6	3		
	4/4		1.5	4	OH	4.0' - 8.0': Reddish Brown, CLAY, some Silt, tr. Organic Matter, hard, moist.
			1.4	5		
			1.3	6		
			0.6	7		
				8		EOB @ 8.0-ft bgs
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-26-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push

Soil Boring Number: SB-07

Sampling Method: Sterilized acetate sleeves

Sheet 1 of 1

LOG OF SOIL BORING

Coordinates: Northing 1027157.138 Easting: 1084484.459
Surface Elevation: 595.65
Casing Below Surface: N/A
Reference Elevation: 595.65
Reference Description: Surface Elevation

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-26-12	DATE: 10-26-12
Date:					TIME: 07:25	TIME: 07:36

Surface Conditions: Athletic Field (Grass, Topsoil)
Weather: Sunny, 5-10 mph S
Temperature: 67F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.0	0	OL	0.0': Topsoil: Dark Brown, SILT and CLAY, some f. Sand, tr. Organic Matter, soft, moist. 0.2' - 2.0': Fill: Black - Dark Brown, Brick, Cinders, Gravel, hard, moist.
			1.4	1		
			0.9	2	SM	2.0' - 4.0': Brown, SILT and f. SAND, hard, moist.
			0.0	3		
	4/4		0.0	4	CH	4.0' - 8.0': Light Brown, CLAY, tr. Silt, hard, moist.
			0.0	5		
			0.0	6		
			0.0	7		
	4/4		0.0	8		8.0' - 12.0': Gray, CLAY, tr. Silt, hard, moist.
			0.0	9		
			0.0	10		
			0.0	11		
				12		EOB @ 12.0-ft bgs
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-26-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027392.75 Easting: 1084834.944
Surface Elevation: 597.12
Casing Below Surface: N/A
Reference Elevation: 597.12
Reference Description: Surface Elevation

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-08
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-26-12	DATE: 10-26-12
Date:					TIME: 09:40	TIME: 09:47

Surface Conditions: Grass, Topsoil
Weather: Sunny, 5-10 mph S
Temperature: 67F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.1	0		0.0' - 4.0': Fill: Dark Brown, Cinders, Glass, Gravel, soft, dry.
			2.4	1		
			3.1	2	OL	4.0' - 6.0': Brownish Gray, SILT and CLAY, tr. Organic Matter, hard, moist.
			1.2	3		
	4/4		0.2	4		
			0.7	5		
			1.1	6	CH	6.0' - 8.0': Gray, CLAY, hard, moist.
			1.4	7		
				8		EOB @ 8.0-ft bgs
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-26-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027245.623 Easting: 1084853.389
Surface Elevation: 595.6
Casing Below Surface: N/A
Reference Elevation: 595.6
Reference Description: Surface Elevation

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-09
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-26-12	DATE: 10-26-12
Date:					TIME: 09:20	TIME: 09:30

Surface Conditions: Grass, Topsoil
Weather: Sunny, 5-10 mph S
Temperature: 67F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		4.7	0	SP	0.0': Topsoil: Dark Brown, m-c Sand, some Gravel, tr. Organic Matter, medium stiff, moist.
					OL	0.2' - 4.0': Brown, SILT, tr. Clay, tr. Organic Matter, hard, dry.
			2.6	1		
			2.4	2		
			1.2	3		
	4/4		1.0	4	OH	4.0' - 8.0': Brown, CLAY, tr. Silt, tr. Organic Matter, medium plasticity, hard, moist.
			2.3	5		
			0.3	6		
			1.6	7		
				8		EOB @ 8.0-ft bgs
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-26-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push

Soil Boring Number: SB-10

Sampling Method: Sterilized acetate sleeves

Sheet 1 of 1

LOG OF SOIL BORING

Coordinates: Northing 1027087.154 Easting: 1084843.415

Surface Elevation: 595.68

Casing Below Surface: N/A

Reference Elevation: 595.68

Reference Description: Surface Elevation

Water Level:				
Time:				
Date:				

Drilling	
Start	**Finish**
DATE: 10-26-12	DATE: 10-26-12
TIME: 09:00	TIME: 09:10

Surface Conditions: Grass, Topsoil

Weather: Sunny, 5-10 mph S

Temperature: 67F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
			0.0	0	SP	0.0': Topsoil: Dark Brown, m-c Sand, some Gravel, tr. Organic Matter, medium stiff, moist.
					OL	0.2' - 4.0': Light Brown, SILT, some Clay, tr. f. Sand, tr. Organic Matter, soft, dry.
			2.2	1		
	4/4					
			1.8	2		
			1.5	3		
			0.1	4	OH	4.0' - 6.0': Light Brown, CLAY and SILT, tr. f. Sand, hard, dry.
			0.3	5		
	4/4					
			1.4	6		6.0' - 8.0': Gray, CLAY, moderate plasticity, hard, moist.
			1.3	7		
				8		EOB @ 8.0-ft bgs
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-26-12

Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.5" Hollow Stem Auger

Soil Boring Number: SB-11

Sampling Method: 55 / macro Cores

Sheet 1 of 1

LOG OF SOIL BORING

Coordinates: Northing 1027171.742 Easting: 1084688.557
Surface Elevation: 604.21
Casing Below Surface: N/A
Reference Elevation: 604.21
Reference Description: Surface Elevation

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 11-16-12	DATE: 11-16-12
Date:					TIME: 14:40	TIME: 1650

Surface Conditions: Gravel
Weather: Sunny
Temperature: 38F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
12	2/1.5		1.1	0		0.0'-1.5': Fill: CLAY and SILT, some fine SAND, some GRAVEL, glass, slag, wood; hard; moist
23						
14				1		
18						
21	2/2		3.7	2		2.0'-2.5': Fill: Brown; CLAY and SILT, some fine SAND, trace GRAVEL, trace glass, trace slag; hard; moist
19						2.5'-4.0': Fill: Black; CLAY and SILT, some fine SAND, trace GRAVEL, trace glass, trace slag; hard; moist
31				3		
24						
5	2/2		11.1	4		4.0'-6.0': Fill: Gray; CLAY and SILT, some fine SAND, trace GRAVEL, trace glass, trace slag, brick; hard; moist
6						
7				5		
10						
10	2/2		10.5	6		6.0'-8.0': Fill: Brown; CLAY and SILT, trace glass, trace slag, trace metal fragments; hard; moist
10						
9				7		
9						
6	2/2		10.8	8		8.0'-9.0': Fill: Brown; CLAY and SILT, trace glass, trace slag, trace metal fragments; hard; moist
2						
8				9		9.0'-10.0': Fill: loose slag and gravel; saturated. Unable to sample, no sediment
21						
15	2/2		6.2	10		10.0'-12.0': Fill: Black; CLAY and SILT, some fine SAND, coal, slag, glass; stiff; saturated
14						
20				11		
16						
10	2/1.5		5.1	12		12.0'-13.5': Fill: Black; CLAY and SILT, some fine SAND, coal, slag, glass; stiff; saturated
6						
5				13		
18						
6	2/1.8		0.0	14		14.0'-15.8': Light brown; SILT and CLAY; hard; moist; moderate plasticity
9						
16				15		
24						
25	2/2		0.0	16		16.0'-18.0: Light brown; SILT and CLAY; hard; moist; moderate plasticity
28						
33				17		
40						
				18		End of hole at 18 ft bgs
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 11-16-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027237.4 Easting: 1084662.13
Surface Elevation: 609.54
Casing Below Surface: N/A
Reference Elevation: 609.54
Reference Description: Surface Elevation

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-12
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 10-25-12	DATE: 10-25-12
Date:					TIME: 15:20	TIME: 15:45

Surface Conditions: Grass, Topsoil
Weather: Sunny, 10-15 mph S
Temperature: 75F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/2		0.0	0		0.0'-2.0': Brown (fill); GRAVEL, some medium SAND, trace glass
			0.1	1		
				2		2.0'-4.0': No recovery
				3		
	4/0			4		4.0' - 8.0': No recovery
				5		
				6		
				7		
	4/2		3.2	8		8.0'-10.0': Brown (fill); GRAVEL, some medium SAND, trace glass
			0.0	9		
				10		10.0'-12.0': No recovery
				11		
	4/4		0.0	12		12.0'-16.0': Brown; CLAY, some SILT
			0.0	13		
			0.0	14		
			0.0	15		
	4/4		0.0	16		16.0'-18.0': Black (fill); ash GRAVEL, coarse SAND; moist
			0.0	17		
			0.0	18		18.0'-20.0': Reddish brown; CLAY, trace SILT; moist; soft
			0.0	19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-25-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push

Soil Boring Number: SB-13

Sampling Method: Sterilized acetate sleeves

Sheet 1 of 1

LOG OF SOIL BORING

Coordinates: Northing 1027311.769 Easting: 1084718.061

Surface Elevation: 613.95

Casing Below Surface: N/A

Reference Elevation: 613.95

Reference Description: Surface Elevation

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-25-12	DATE: 10-25-12
Date:					TIME: 14:00	TIME: 15:00

Surface Conditions: Gravel, debris

Weather: Sunny

Temperature: 70F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/1		19.5	0		0.0'-1.0': Brown; GRAVEL and SAND, some SILT, ash (fill); dry
				1		1.0'-2.0': No recovery
	4/0.5		0.7	2		2.0'-2.5': Black; Ash, GRAVEL, some medium SAND (fill); dry
				3		
	4/2			4		4.0' - 6.0': Brown; fill (ash, slag, medium SAND, trace GRAVEL)
				5		
	4/4			6		6.0'-8.0': Brown; fill (ash, slag, medium SAND, trace GRAVEL)
				7		
				8		8.0-'12.0': Tan; SILT, trace CLAY, trace GRAVEL; dry; hard
				9		
				10		
				11		
				12		
				13		
				14		
				15		
	4/2		0.0	16		16.0'-18.0': Dark brown; CLAY and SILT, some GRAVEL, trace glass; moist
				17		
				18		18.0'-20.0': No recovery
				19		
	4/2		0.0	20		20'-22': Fill; black; medium to coarse SAND and GRAVEL, some glass
			9.1	21		
				22		
				23		23.0'-25.0': Gray; CLAY, trace SILT; hard; moist
	4/2			24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-25-12

Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027413.597 Easting: 1084762.285
Surface Elevation: 594.22
Casing Below Surface: N/A
Reference Elevation: 594.22
Reference Description: Surface Elevation

Job. No.	Client:	Location:
1490710	Project: Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-14
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-25-12	DATE: 10-25-12
Date:					TIME: 13:05	TIME: 13:25

Surface Conditions: Grass / topsoil
Weather: Sunny
Temperature: 75F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.9	0		0.0'-3.0': Reddish brown; SILT, trace CLAY, trace organics; soft; dry
			1.6	1		
			1.1	2		
			0.3	3		3.0'-4.0': Brown; CLAYEY SILT, trace organics; hard; dry
	4/4		0.0	4		4.0' - 7.0': Brown; CLAYEY SILT, trace organics; hard; dry
			0.6	5		
			0.2	6		
			0.0	7		7.0'-8.0': Grayish brown; SILT and CLAY; moderate plasticity; moist; hard
	4/4		0.0	8		8.0-'12.0': Gray; CLAY; very plastic; soft; moist
			0.0	9		
			0.0	10		
			0.0	11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-25-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027403.713 Easting: 1084594.065
Surface Elevation: 594.98
Casing Below Surface: N/A
Reference Elevation: 594.98
Reference Description: Surface Elevation

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-15
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-25-12	DATE: 10-25-12
Date:					TIME: 11:45	TIME: 12:00

Surface Conditions: Grass / topsoil
Weather: Sunny
Temperature: 75F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/2		1.0	0		0.0'-1.0': Brown; medium to fine SAND, some GRAVEL; Dry; fill
			2.8	1		1.0'-2.0': Dark brown; CLAY, some SILT, trace SAND, trace organics; moist
			x	2		2.0'-4.0': No recovery
			x	3		
	4/4		1.2	4		4.0' - 8.0': Brown; CLAYEY SILT; hard; moist
			5.4	5		
			6.3	6		
			3.6	7		
	4/4		0.0	8		8.0'-11.0': Brown; CLAYEY SILT; hard; moist
			0.0	9		
			0.0	10		
			0.0	11		11.0'-12.0': Gray; CLAYEY SILT; hard; moist
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-25-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027293.294 Easting: 1084577.359
Surface Elevation: 595.53
Casing Below Surface: N/A
Reference Elevation: 595.53
Reference Description: Surface Elevation

Job. No.	Client:	Location:
1490710	NYSDEC	Lackawanna, NY
	Project: Lackawanna Former Incinerator Site	

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-16
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-25-12	DATE: 10-25-12
Date:					TIME: 10:50	TIME: 11:10

Surface Conditions: Grass / topsoil
Weather: Sunny
Temperature: 75F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.0	0		0.0'-2.0': Dark brown; fine to medium SAND, trace SILT, trace GRAVEL (fill); moist
			5.6	1		
			3.9	2		2.0'-4.0': Reddish brown; SILTY CLAY, trace organics; moist; moderate plasticity
			3.4	3		
	4/4		0.2	4		4.0' - 8.0': Reddish brown; SILTY CLAY, trace organics; moist; moderate plasticity
			2.4	5		
			1.0	6		
			0.0	7		
	4/4		0.0	8		8.0'-10.0': Reddish brown; SILTY CLAY, trace organics; moist; moderate plasticity
			0.0	9		
			0.0	10		10.0'-12.0': Gray; CLAYEY SILT; moderate plasticity; hard; moist
			0.0	11		
	4/4		0.0	12		10.0'-16.0': Gray; CLAYEY SILT; moderate plasticity; hard; moist
			0.0	13		
			0.0	14		
			0.0	15		
				16		End of hole at 16' bgs
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-25-12
Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: Geoprobe Direct-Push

Soil Boring Number: SB-16

Sampling Method: Sterilized acetate sleeves

Sheet 1 of 1

LOG OF SOIL BORING

Coordinates: Northing 1027251.878 Easting: 1084580.335

Surface Elevation: 595.53

Casing Below Surface: N/A

Reference Elevation: 595.53

Reference Description: Surface Elevation

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-25-12	DATE: 10-25-12
Date:					TIME: 10:10	TIME: 10:25

Surface Conditions: Gravel / soil

Weather: Sunny, 10-15 mph south

Temperature: 75F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/4		0.0	0		0.0'-1.0': Dark brown; SAND and SILT, trace GRAVEL (fill); moist
			0.5	1		1.0'-4.0': Reddish brown; CLAY, trace SILT; moist
			9.6	2		
			4.5	3		
	4/4		0.8	4		4.0' - 8.0': Reddish brown; CLAY, trace SILT; moist
			0.9	5		
			0.3	6		
			0.7	7		
	4/4		13.6	8		8.0'-12.0': Reddish brown; CLAY, trace SILT; moist
			10.3	9		
			4.8	10		
			3.7	11		
				12		End of hole at 12' bgs
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		

Logged by: Robert Peterson Date: 10-25-12

Drilling Contractor: GeoLogic NY, Inc. Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027162.282 Easting: 1084602.833
Surface Elevation: 596.4
Casing Below Surface: N/A
Reference Elevation: 596.4
Reference Description: Surface Elevation

Job. No.	Client:	Location:
1490710	NYSDEC	Lackawanna, NY
	Project: Lackawanna Former Incinerator Site	

Drilling Method: Geoprobe Direct-Push
Soil Boring Number: SB-16
Sampling Method: Sterilized acetate sleeves
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-26-12	DATE: 10-26-12
Date:					TIME: 10:05	TIME: 10:20

Surface Conditions: Gravel / soil
Weather: Sunny, 10-15 mph south
Temperature: 75F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	4/3		2.2	0		0.0'-3.0': Dark brown; CLAYEY SILT, some GRAVEL, some glass; hard; moist (fill)
			3.4	1		
			1.7	2		
			x	3		3.0'-4.0': No recovery
	4/0.5		x	4		4.0' - 4.5': Black; CLAYEY SILT, some GRAVEL, some glass; hard; wet (fill) 4.5'-8.0': No recovery
			x	5		
			x	6		
			x	7		
	4/4		0.0	8		8.0'-12.0': Gray; CLAY, trace organics; hard; high plasticity
			0.0	9		
			0.0	10		
			0.0	11		
	4/4			12		12.0'-16.0': Gray; CLAY, trace organics; hard; high plasticity
				13		
				14		
				15		
	4/4			16		16.0'-20.0': Gray; CLAY, trace organics; hard; high plasticity
				17		
				18		
				19		
	4/4			20		20.0'-24.0': Gray; CLAY, trace organics; hard; high plasticity; wet/saturated
				21		
				22		
				23		
	4/4			24		24.0'-28.0': Gray; CLAY, trace organics; hard; high plasticity; wet/saturated
				25		
				26		
				27		
				28		End of hole at 28' bgs
				29		

Logged by: Robert Peterson
Drilling Contractor: GeoLogic NY, Inc.
Date: 10-26-12
Driller: Dave Lyons

EA Engineering, P.C.
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LOG OF SOIL BORING

Coordinates: Northing 1027450.399 Easting: 1084753.743
Surface Elevation: 595.7
Casing Below Surface: 565.7
Reference Elevation: 598.19
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" hollow stem auger
Soil Boring Number: MW-02A
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 10-29-12	DATE: 10-29-12
Date:					TIME: 10:50	TIME: 16:00

Surface Conditions: Grass / topsoil
Weather: Overcast, rain
Temperature: 48F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
	2/1		1.6	0		0.0': Topsoil: dark brown; fine SAND and GRAVEL, trace organics; wet
				1		0.0'-2.0': Fill: dark brown to black; cinders, glass, SILT, ash, GRAVEL; moist
	2/1		2.6	2		2.0'-3.0': Fill: dark brown to black; cinders, glass, SILT, ash, GRAVEL; moist
				3		
	2/0.3		1.9	4		4.0'-4.3': Fill: dark brown to black; cinders, glass, SILT, ash, GRAVEL; moist
				5		
	2/1		2.2	6		6.0'-7.0': Reddish brown; CLAY, some SILT; stiff; moist; iron stained fractures
				7		
	2/2		0.7	8		8.0'-10.0': Reddish brown; CLAY, some SILT; stiff; moist; iron stained fractures
				9		
	2/2		0.0	10		10.0'-12.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures
				11		
	2/2		0.0	12		12.0'-14.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; wet
				13		
	2/2		0.0	14		14.0'-16.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; wet
				15		
	2/2		0.0	16		16.0'-12.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; wet
				17		
	2/2		0.0	18		
				19		
	2/2		0.0	20		20.0'-22.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; saturated
				21		
	2/2		0.0	22		22.0'-24.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; saturated
				23		
	2/2		0.0	24		24.0'-26.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; wet
				25		
	2/2		0.0	26		26.0'-28.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; wet
				27		
	2/2		0.0	28		28.0'-30.0': Gray; CLAY, some SILT; stiff; moist; iron stained fractures; wet
				29		
						End of hole at 30' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	30	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	20	To	30	ft bgs
Riser Interval:	0	To	20	ft bgs
Sand Pack Interval:	18	To	30	ft bgs
Bentonite Seal:	15	To	18	ft bgs
Grout Interval:	0	To	15	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Date: 10-29-12
Drilling Contractor: GeoLogic NY, Inc.
Driller: Dave Lyons

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EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027162.282 Easting: 1084602.833
Surface Elevation: 596.4
Casing Below Surface: 566.4
Reference Elevation: 596.14
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" Hollow stem auger
Soil Boring Number: MW-03A
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

Water Level:					Drilling Start	Drilling Finish
Time:					DATE: 10-31-12	DATE: 10-31-12
Date:					TIME: 0820	TIME: 1030

Surface Conditions: Gravel / topsoil
Weather: Overcast
Temperature: 48F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	PID (ppm)	Depth in Feet	USCS Log	
	2/2	0.0	0		0.0'-2.0': Fill: Black; GRAVEL, slag, and SILTY CLAY, trace organic matter; stiff; moist
		0.1	1		
	2/0		2		2.0'-4.0': Large piece of slag stuck in split spoon. No recovery
			3		
	2/2	0.0	4		4.0'-5.0': Brown-gray; SILT, trace CLAY; stiff; wet
		0.0	5		5.0'-6.0': Brown-gray; CLAY, some SILT; moderate plasticity; wet
			6		
			7		
			8		
			9		
	2/2		10		10.0'-12.0': Gray; CLAY and SILT; hard; moist
			11		
			12		
			13		
			14		
	2/2		15		15.0'-17.0': Gray; CLAY, some SILT; moderate plasticity; hard; moist; laminations
			16		
			17		
			18		
			19		
	2/2		20		20.0'-22.0': Gray; CLAY, trace SILT; moderate plasticity; soft; wet - saturated
			21		
			22		
			23		
			24		
	2/2		25		25.0';27.0': Gray; CLAY; high plasticity; soft; saturated
			26		
			27		
			28		28.0'-30.0': Gray; CLAY; high plasticity; soft; saturated
			29		
					End of hole at 30' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	30	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	20	To	30	ft bgs
Riser Interval:	0	To	20	ft bgs
Sand Pack Interval:	19	To	30	ft bgs
Bentonite Seal:	16	To	19	ft bgs
Grout Interval:	0	To	16	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Date: 10-31-12
Drilling Contractor: GeoLogic NY, Inc.
Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1026893.482 Easting: 1084710.752
Surface Elevation: 596.45
Casing Below Surface: 566.45
Reference Elevation: 596.22
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" Hollow stem auger
Soil Boring Number: MW-04
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 11-2-12	DATE: 11-5-12
Date:					TIME: 1200	TIME: 1035

Surface Conditions: Asphalt
Weather: Overcast
Temperature: 40F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	PID (ppm)	Depth in Feet	USCS Log	
			0		0'-0.5': Asphalt (1" thick), sub-base material
16	2/2				0.5'-2.0': Fill: Black; cinders, slag, brick, GRAVEL, medium SAND; wet; soft
17		1.5	1		
6					
4	2/2	1	2		2.0'-4.0': Light brown; SILT, some fine SAND; medium; wet
8					
9		0.5	3		
8					
2	2/2	0.0	4		4.0'-6.0': Light brown-gray; SILT, trace CLAY, trace organics; stiff; moist; horizontal laminations
3					
5			5		
6					
			6		
			7		
			8		
			9		
5	2/2	0.0	10		10.0'-12.0': Gray; SILT and CLAY; stiff; moist; laminations
5					
17			11		
10					
			12		
			13		
			14		
3	2/2	0.0	15		15.0'-17.0': Gray; SILT and CLAY; stiff; moist; laminations
3					
5			16		
6					
			17		
			18		
			19		
1	2/2	0.0	20		20.0'-22.0': Gray; SILT and CLAY; stiff; moist; laminations; saturated; soft
4					
2			21		
2					
			22		
			23		
			24		
3	2/2	0.0	25		25.0';27.0': Gray; SILT and CLAY; stiff; moist; laminations; saturated; soft
3					
3			26		
3					
			27		
2	2/2	0.0	28		28.0'-30.0': Gray; SILT and CLAY; stiff; moist; laminations; saturated; soft
3					
2			29		
2					End of hole at 30' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	30	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	20	To	30	ft bgs
Riser Interval:	0	To	20	ft bgs
Sand Pack Interval:	18	To	30	ft bgs
Bentonite Seal:	15	To	18	ft bgs
Grout Interval:	0	To	15	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Drilling Contractor: GeoLogic NY, Inc.
Date: 11-5-12
Driller: Dave Lyons

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LOG OF SOIL BORING

Coordinates: Northing 1027317.89 Easting: 1084807.567
Surface Elevation: 596.33
Casing Below Surface: 566.33
Reference Elevation: 596.03
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" Hollow stem auger
Soil Boring Number: MW-05
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 11-1-12	DATE: 11-2-12
Date:					TIME: 1415	TIME: 0900

Surface Conditions: Grass / topsoil
Weather: Overcast / rain
Temperature: 48F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
5	2/2		3.2	0		0'-1.5': Light brown; SILT and CLAY, some organics, trace glass and slag
6						
7			x	1		
8						1.5'-2.0': Fill: Dark brown; glass, slag, wood, CLAY and SILT, GRAVEL; hard; moist
7	2/2		1.3	2		2.0'-3.0': Fill: Dark brown; glass, slag, wood, CLAY and SILT, GRAVEL; hard; moist
7						
9			1.5	3		3.0'-4.0': Light brown; SILT, trace CLAY, trace organics; stiff; moist
12						
5	2/2		1.0	4		4.0'-6.0': Light brown; SILT, trace CLAY, trace organics; stiff; moist; laminations; oxidized
6						
8				5		
11						
				6		
				7		
				8		
				9		
5	2/2		0.0	10		10.0'-12.0': Gray; SILT and CLAY; vertical laminations; hard; moderate plasticity; moist
7						
9				11		
11						
				12		
				13		
				14		
3	2/2		0.0	15		15.0'-17.0': Gray; SILT and CLAY; vertical laminations; hard; moderate plasticity; moist
3						
5				16		
6						
				17		
				18		
				19		
10	2/2		0.0	20		20.0'-22.0': Gray; SILT and CLAY; vertical laminations; hard; moderate plasticity; moist
5						
6				21		
10						
				22		
				23		
				24		
W0H	2/2		0.0	25		25.0';27.0': Gray; SILT and CLAY; moderate plasticity; saturated; soft
W0H						
W0H				26		
2						
				27		
W0H	2/2		0.0	28		
W0H						
W0H				29		
1						End of hole at 30' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	30	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	20	To	30	ft bgs
Riser Interval:	0	To	20	ft bgs
Sand Pack Interval:	17	To	30	ft bgs
Bentonite Seal:	14	To	17	ft bgs
Grout Interval:	0	To	14	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Date: 11-1-12
Drilling Contractor: GeoLogic NY, Inc.
Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027339.096 Easting: 1084566.429
Surface Elevation: 595.07
Casing Below Surface: 565.07
Reference Elevation: 594.8
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" Hollow stem auger
Soil Boring Number: MW-06
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 10-31-12	DATE: 11-1-12
Date:					TIME: 1600	TIME: 0900

Surface Conditions: Gravel
Weather: Overcast / rain
Temperature: 47F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	PID (ppm)	Depth in Feet	USCS Log	
11	2/2	5.5	0		0'-2.0': Fill: Black; CLAY and SILT, slag, GRAVEL, organic matter; hard; moist
10					
10		6.9	1		
8					
9	2/2	4	2		2.0'-4.0': Brown-gray; SILT and CLAY, trace organic matter; hard; moist
11					
12		3.9	3		
12					
2	2/2		4		4.0'-6.0': Brown-gray; SILT and CLAY, trace organic matter; hard; moist
3					
6			5		
7					
8	2/2		6		6.0'-8.0': Brown-gray; SILT and CLAY, trace organic matter; hard; moist; laminated
11					
15			7		
22					
			8		
			9		
6	2/2		10		10.0'-11.0': Brown-gray; SILT and CLAY, trace organic matter; hard; moist; laminated
7					
9			11		11.0'-12.0': Gray; CLAY, some SILT; hard; moist
12					
			12		
			13		
			14		
3	2/2		15		15.0'-17.0': Gray; CLAY, some SILT; hard; moist
4					
7			16		
8					
			17		
			18		
			19		
1	2/2		20		20.0'-22.0': Gray; CLAY; soft; saturated; high plasticity
W0H					
1			21		
1					
			22		
			23		
			24		
W0H	2/2		25		25.0';27.0': Gray; CLAY; soft; saturated; high plasticity
W0H					
W0H			26		
W0H					
			27		
2	2/1		28		28.0'-30.0': Gray; CLAY; soft; saturated; high plasticity
3					
12			29		
15					End of hole at 30' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	30	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	20	To	30	ft bgs
Riser Interval:	0	To	20	ft bgs
Sand Pack Interval:	17	To	30	ft bgs
Bentonite Seal:	14	To	17	ft bgs
Grout Interval:	0	To	14	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Date: 10-31-12
Drilling Contractor: GeoLogic NY, Inc.
Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027450.337 Easting: 1084651.689
Surface Elevation: 595.4103
Casing Below Surface: 568.41032
Reference Elevation: 595.15
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" Hollow stem auger
Soil Boring Number: MW-07
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 11-5-12	DATE: 11-5-12
Date:					TIME: 1425	TIME: 1800

Surface Conditions: Grass / Topsoil
Weather: Overcast
Temperature: 40F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	Boring Diagram	PID (ppm)	Depth in Feet	USCS Log	
4	2/1.5		0.0	0		0'-1.5': Topsoil: Grass, organic matter
9						
14			1.2	1		
8						1.5': Fill: Glass, brick, slag, SILT and CLAY; soft; moist
2	2/1		0.9	2		2.0'-3.0': Fill: Glass, brick, slag, SILT and CLAY; soft; moist
2						
5			3.8	3		
7						
2	2/1		2.5	4		4.0'-4.5': Fill: Glass, brick, slag, SILT and CLAY; soft; moist
2						4.5'-5.0': Gray; SILT, some CLAY; soft; moist
3			0.0	5		
3						
1	2/1.5		0.0	6		6.0'-7.5': Light brown; SILT, some CLAY; hard; moist
2						
5				7		
8						
				8		
				9		
2	2/2		0.0	10		
3						
3				11		
4						
				12		
				13		
				14		
2	2/2		0.0	15		15.0'-17.0': Gray; CLAY and SILT; hard; moist; moderate plasticity
2						
1				16		
2						
				17		
				18		
				19		
W0H	2/2		0.0	20		20.0'-22.0': Gray; CLAY, some SILT; soft; saturated; high plasticity
1						
1				21		
2						
				22		
				23		
				24		
1	2/2		0.0	25		25.0';27.0': Gray; CLAY, some SILT; soft; saturated; high plasticity; auger drilling became hard at 27'
1						
1				26		
2						
				27		
14	2/1		0.0	28		
21						
23				29		
31						End of hole at 30' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	27	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	17	To	27	ft bgs
Riser Interval:	0	To	17	ft bgs
Sand Pack Interval:	15	To	27	ft bgs
Bentonite Seal:	12	To	15	ft bgs
Grout Interval:	0	To	12	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Drilling Contractor: GeoLogic NY, Inc.
Date: 11-5-12
Driller: Dave Lyons

EA Engineering, P.C.
EA Science and Technology

LOG OF SOIL BORING

Coordinates: Northing 1027476.56 Easting: 1084456.249
Surface Elevation: 593.561
Casing Below Surface: 571.56096
Reference Elevation: 593.42
Reference Description: TOC

Job. No.	Client:	NYSDEC	Location:
1490710	Project:	Lackawanna Former Incinerator Site	Lackawanna, NY

Drilling Method: 4.25" Hollow stem auger
Soil Boring Number: MW-08
Sampling Method: 3" diameter split spoon
Sheet 1 of 1

					Drilling	
Water Level:					**Start**	**Finish**
Time:					DATE: 11-6-12	DATE: 11-6-12
Date:					TIME: 1000	TIME:

Surface Conditions: Grass / Topsoil
Weather: Mostly cloudy
Temperature: 35F

Blow Counts (140-lb)	Ft. Driven/ Ft. Recvrd	PID (ppm)	Depth in Feet	USCS Log	
3	2/1.5	6.7	0		0'-0.2': Topsoil: Dark brown; fine SAND and SILT, trace organic matter; soft; moist
5					0.2'-1.5': Fill: Brown; glass, brick, wood, SILT and CLAY; loose; moist
6			1		
7					
5	2/1	1	2		2.0'-3.0': Fill: Brown; glass, brick, metal fragments; loose; moist
3					
2			3		
1					
1	2/0.3	0.0	4		4.0'-4.3': Fill: Brown; glass, brick, metal fragments; loose; moist
W0H					
W0H			5		
1					
4	2/2	0.0	6		6.0'-8.0': Brown; SILT/CLAY; hard; moist
14					
19			7		
31					
			8		
			9		
2	2/2		10		10.0'-12.0': Gray; CLAY and SILT; hard; moist; moderate plasticity
2					
2			11		
2					
			12		
			13		
			14		
1	2/2		15		15.0'-17.0': Gray; CLAY and SILT; hard; soft; saturated; high plasticity
1					
2			16		
1					
			17		
			18		
			19		
W0H	2/2		20		20.0'-22.0': Gray; CLAY and SILT; hard; soft; saturated; high plasticity; drilling became hard at 22' (till)
W0H					
2			21		
3					
			22		
			23		
			24		
25	2/2		25		25.0';27.0': Till: CLAY and SILT, some fine SAND, trace GRAVEL
17					
27			26		
36					
			27		
			28		
			29		
					End of hole at 27' bgs

Monitoring Well Construction Information

Monitoring Well Diameter:	2	in		
Bottom of Monitoring Well:	22	ft bgs		
Stick Up or Flush Mount:	Stick up			
Screen Interval:	12	To	22	ft bgs
Riser Interval:	0	To	12	ft bgs
Sand Pack Interval:	10	To	22	ft bgs
Bentonite Seal:	8	To	10	ft bgs
Grout Interval:	0	To	8	ft bgs

Soil Vapor Point Installation Information

Depth of Soil Vapor Point:	N/A	ft
Bottom of Tubing:	N/A	ft
Top of Sand Pack:	N/A	ft
Top of Bentonite Seal:	N/A	ft

Logged by: Robert Peterson
Drilling Contractor: GeoLogic NY, Inc.
Date: 11-6-12
Driller: Dave Lyons

APPENDIX D – EXCAVATION WORK PLAN (EWP)

D-1 NOTIFICATION

This Excavation Work Plan (EWP) applies to Section 142.14 Block 1 Lots 4.1 and 5.112 at the Site as described in the Environmental Easement (Appendix A).

Note that the banks of Smokes Creek in the Corridor Area (from the top of bank, riverward) are part of a federally-constructed flood control project. Any significant disturbance or alteration of those banks may require Section 408 permission of the US Army Corps of Engineers.

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Under emergency circumstances (e.g. work required to prevent loss of life or property; restoration of electrical and/or natural gas service) work may be conducted prior to notification of the NYSDEC; the NYSDEC will be notified as soon as possible thereafter. Table D-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B of the SMP.

Table D-1: Notifications*

Evelyn Hussey	518.402.6786 evelyn.hussey@dec.ny.gov
Sarah Saucier	518.402.9675 Sarah.Saucier@dec.ny.gov
Leonard Zinoman	518.402.9553 leonard.zinoman@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix H of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP.

D-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g., photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will

be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section D-6 and D-7 of this Appendix.

D-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. Stockpiled material not being re-used will be scheduled for transportation to the appropriate disposal facility in a timely manner.

D-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

D-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes will be approved prior to use. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

D-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this

site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility) Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

D-7 MATERIALS REUSE ON-SITE

The qualified environmental professional as defined in 6 NYCRR Part 375 will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e., contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling

frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (October 2020 or date of current version, whichever is later) guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections D-2 and D-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

D-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e., a local pond, stream or river) will be performed under a SPDES permit.

D-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Record of Decision (ROD). The existing cover system in the Incinerator Area is comprised of a minimum of 12 inches of clean soil or existing buildings where applicable. The existing cover system in the Corridor Area consists of 24 inches of clean fill on embankment slopes or 12 inches of cover soil, or asphalt pavement, on the top of the embankment. The demarcation layer, consisting of orange snow fencing material or equivalent material will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

D-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix K.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for residential use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 375-6.8(b): Restricted Use Soil Cleanup Objectives. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

D-11 STORMWATER POLLUTION PREVENTION

Smaller-scale disturbances for future utility maintenance and landscaping conducted after the completion of site redevelopment are not anticipated to require coverage under the general SPDES Permit or preparation of a Storm Water Pollution Prevention Plan (SWPPP). However, best management practices, such as the placement of silt fencing and hay bales at the perimeter of soil stockpiles and/or the use of polyethylene liners and covers, will be implemented during small-scale soil disturbances that have the potential to encounter impacted materials.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

D-12 EXCAVATION CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions. The objectives during any emergency will be to protect human health and safety, and then the environment. A qualified environmental professional will determine the best course of action for dealing with the emergency and possible follow-up requirements that may result from implementing those actions (e.g., erosion of cover due to severe weather conditions, injury to Site inspection workers, discovery of an unknown source of contamination during future excavation activities that may require remediation).

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

D-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will be consistent with the guidance provided in the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan contained in Appendix 1A of DER-10. The location of air sampling stations based on generally prevailing wind conditions. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. Due to the presence of a sensitive receptor to the East of the Site, the Baker School, a fixed monitoring station will be located on the eastern perimeter of the site, regardless of wind direction.

A figure showing the location of air sampling stations will be prepared as part of the EWP and adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

D-14 ODOR CONTROL PLAN

Odors are not anticipated based upon remaining contamination at the site. Therefore, an Odor Control Plan is not included as part of the SMP.

D-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section D-13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

D-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX E – HEALTH AND SAFETY PLAN

APPENDIX E

HEALTH AND SAFETY PLAN AT A GLANCE

LACKAWANNA INCINERATOR SITE
SITE # 915206
LACKAWANNA, NEW YORK

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway
Albany, New York 12233

Prepared by:

AECOM, USA Inc.
One John James Audubon Parkway
Suite 210
Amherst, New York 14228

October 2022

HEALTH AND SAFETY PLAN AT A GLANCE
LACKAWANNA INCINERATOR SITE

		PHONE
AECOM Project Number:	60617975	
AECOM Project Manager:	Mike Gutmann	716-923-1120
AECOM Site Manager:	TBD	TBD
AECOM Site Safety Officer:	TBD	TBD
AECOM Plan Preparer:	Kevin J. McGovern, P.G., CHMM	716-923-1101
Preparation Date:	October 3, 2022	
Expiration Date:	October 3, 2023	

This Health and Safety Plan at a Glance presents the core elements of the *HAZWOPER Health and Safety Plan; Lackawanna Incinerator Site* (AECOM, 2020). Its purpose is to provide necessary components for future Site/Task specific Health and Safety Plans.

SAFETY PLAN COMPLIANCE AGREEMENT

I have read the Health and Safety Plan for the project and I understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the Plan.

Name	**Signature**	**Date**
AECOM Site Manager		
AECOM Site Safety Officer		
AECOM Site Personnel		
AECOM Site Personnel		
AECOM Site Personnel		
AECOM Site Personnel		

Subcontractors:

Company	**Signature**	**Date**

HEALTH AND SAFETY PLAN AT A GLANCE
TABLE OF CONTENTS

FIGURES

TABLES

HEALTH AND SAFETY PLAN SUMMARY SHEET

THIS SUMMARY SHEET IS PROVIDED AS A QUICK-REFERENCE/OVERVIEW ONLY. THE REMAINDER OF THIS SITE-SPECIFIC HEALTH AND SAFETY PLAN (HASP) IS INTEGRAL TO THE SAFE CONDUCT OF SITE OPERATIONS AND MUST BE APPLIED IN ITS ENTIRETY.

EMERGENCY INFORMATION

Ambulance:		**911**
Fire:		**911**
Police:		**911**
Hospital:	**Mercy Hospital**	**716-826-7000**
Clinic:	**Immediate Care - Orchard Park**	**716-675-3700**

AECOM Project Manager:
Mike Gutmann **716-923-1120**

AECOM Health, Safety, and Environment Representative:
Kevin McGovern **716-856-5636**

AECOM Regional Manager Health, Safety, and Environment:
Peter Gregory, CSP, MPH, STS **201-602-3511**

National Response Center: **(800) 424-8802**

NYSDEC Project Contact: **TBD**

NYSDOH Project Contact **TBD**

HOSPITAL DIRECTIONS: Mercy Hospital 716-826-7000

Start out going NORTH on South Park Ave. toward Newman St.
Turn RIGHT onto McKinley Pkwy.
At the TRAFFIC CIRCLE, take the 2nd and stay on McKinley Pkwy.
At McClellan Cir, take the 3rd exit and stay on McKinley Pkwy.
Turn RIGHT onto Lorraine Ave.
End at Mercy Hospital

A map with the route to the hospital is shown on Figure 1.

CONSTITUENTS OF CONCERN

1. TAL Metals

SCOPE OF WORK

Task 1: Mobilization of equipment, site reconnaissance, preparation of work areas, establish work zones, utility mark outs.
Task 2: Groundwater Sampling
Task 3: Decontamination of Equipment
Task 4: Demobilization

PROJECT HAZARD ANALYSIS

Task	Chemical Hzds.	Heat/Cold Stress	Noise	Slip/Trip/ Fall	Lifting Hzds.	Mechanical Hzds.	Electrocution	Explosions
1.	Low	Low	Low	Med	Med	Low	N/A	N/A
2.	Low	Med	Low	Med	Med	Low	Low	Low
3.	Low	Med	Low	Low	Med	Med	Low	Low
4.	Low	Med	Low	Low	Low	Low	Low	Low

High - Exposure likely more than 50% of the time
Med - Exposure likely 10 to 50% of the time
Low - Exposure likely less than 10% of the time
n/a – Exposure not anticipated

Additional information concerning project hazards and their control can be found in Table 1.

Task	Task Description	Minimum Protective Clothing/Equipment Requirements
1.	Set Up, Utility Mark-Outs	Steel-toed boots, safety glasses with attached side shields, hard hat, reflective vests, and work gloves. Safety cones and/or channelized cones and poles for delineation of work areas.
2.	Groundwater sampling.	Steel-toed boots, hard hat, safety glasses with attached side shields, reflective vests, hearing protection and nitrile gloves for handling samples. Coated Tyvek® will be available for personnel to use in the event NAPL is encountered in the subsurface. Safety cones and/or channelized cones and poles for delineation of work areas.
3.	Decontamination of Equipment	Steel-toed boots, hard hat, safety glasses with attached side shields, reflective vests, hearing protection, work gloves, nitrile gloves when handling potentially contaminated materials. Safety cones and/or channelized cones and poles for delineation of work areas. Metatarsal protection when pressure washing.
4.	Demobilization	Steel-toed boots, hard hat, safety glasses with attached side shields, reflective vests, and work gloves. Safety cones and/or channelized cones and poles for delineation of work areas.

ENGINEERING CONTROLS TO BE USED (as applicable)

- Barricades for delineation of work areas (exclusion zones)
- Water spray for dust suppression
- Natural wind forces to reduce exposure to airborne contaminants (stay upwind of drilling activities)
- Light-colored PPE to reduce solar load for heat stress control

INSTRUMENTATION THAT MAY BE USED

__ Organic Vapor Monitor (OVM), PID
__ Photovac Microtip PID w/10.6 eV lamp
_x_ MiniRAE PID w/ 10.6 eV lamp
_x_ Combustible Gas/O_2 Indicator (during drilling)
__ Foxboro Organic Vapor Analyzer (OVA) Flame Ionization Detector (FID)
_x_ Miniram Real-time Dust Monitor
__ Other - Cyanide monitor
__ Dräger Kit – or equivalent (benzene)
_x_ Noise Meter

PERSONAL EXPOSURE SAMPLING

___ Will be conducted
___ Will be conducted if PID readings require the use of respiratory protection as described in the Action Level Table (page 4)
_x_ Is not anticipated

HAZ-COM MATERIALS INVENTORY

Alconox (decontamination)

Citrisolve (decontamination) – manufactured by The Organic Dyestuffs Corp.

Isobutylene (calibration gas)

Nitric/Hydrochloric Acid (sample preservative)

Fuel (equipment fuel – diesel or gasoline)

ACTION LEVELS (for Photoionization Detector)

Analyzer Reading (above background)	**Location**	**Duration**	**Action**	**Personal Protective Equipment**
<(5) ppm	Point of Operations/ Release Source point	-----	Continued periodic monitoring.	Minimum site ensemble of steel-toed boots, safety glasses with attached side shields, hard hat, (reflective vests, and work gloves. Nitrile Outer Gloves, and Nitrile Inner gloves as necessary based upon contamination encountered.
1 – 5 ppm (1st Action Level)	OBZ	> 1 minute	Continuous monitoring and screen for benzene using Dräger or comparable real-time monitoring instrument	Minimum Site Ensemble, Ntrile Outer Gloves, and Nitrile Inner gloves, full-face APR with combo organic P-100 cartridge if benzene is detected above 1 ppm.

Analyzer Reading (above background)	Location	Duration	Action	Personal Protective Equipment
5-15 ppm (2nd Action Level)	Point of Operations/Release Source point	> 1 minute	Monitor OBZ to determine whether readings are sustained or intermittent. If intermittent then don protective clothing; establish work zones. If sustained, initiate PPE requirements for 3rd action level.	Minimum Site Ensemble, PLUS: Chemical-resistant boot covers, Nitrile Outer Gloves, and Nitrile Inner gloves. Assess the potential cause of the increase in PID readings (source).
15-50 ppm (3rd Action Level)	OBZ	> 1 minute	Stop work and provide respiratory protection; establish decon areas. Contact the RHSEM to initiate personal exposure monitoring.	Add full-face respirators with combination organic vapor cartridges P-100. Notify the RHSEM of the need for respirators.
>(50)ppm (4th Action Level)	OBZ	>1 minute	Stop work; move upwind while vapors dissipate. If elevated levels remain, cover boring and cuttings, evacuate upwind, and notify RHSEM and PM.	As specified by RHSEM

* Substitute poly-coated Tyvek® if there is potential for contact with liquids (groundwater, mud, etc.).

OBZ = Operator's Breathing Zone ppm = parts per million

ACTION LEVELS (for the Combustible Gas Indicator)

LEL Reading	Location	Action
<10% LEL	Point of Operations/General Work Area	Continue site operations and continue periodic monitoring
10-20% LEL	Point of Operations/General Work Area	Continue site operations and perform continuous monitoring
>20% LEL	Point of Operations/General Work Area	Shutdown operations, evaluate source, ventilate work area

LEL = Lower Explosive Limit

ACTION LEVELS (for H_2S)

Monitor Reading	Location	Action
Instrument Alarm (Alarm to be set at 4.5 ppm)	OBZ/Work Area/Drilling Zone	Stop work, evacuate area, contact health and safety

ACTION LEVELS (for Particulates)

Monitor Reading	Location	Action
100 µg/m^3 above background	OBZ/Downwind Location	Employ dust suppression techniques.
150 µg/m^3 above background	OBZ/Downwind Location	Shutdown operations, re-evaluate activities and dust suppression techniques.

µg/m^3 = micrograms per cubic meter

TABLE 1

JOB HAZARD ANALYSES

AECOM USA, Inc. Lackawanna Incinerator Site	DATE 6/10/2022	☒ NEW ☐ REVISED	PAGE 1 of 4
WORK ACTIVITY (Description): **Mobilization of equipment, site reconnaissance, preparation of work areas, establish work zones, utility mark outs**			
DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY:	POSITION/TITLE
Mike Gutmann	Project Manager	Kevin McGovern, CHMM	HSE Representative
		Peter Gregory, CSP, MPH, STS	RHSEM
	Site Geologist (SSO)	TBD	SSO
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST ☒ HARD HAT ☒ SAFETY GLASSES ☒ PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO	☒ SAFETY SHOES Steel-toe ☐ HEARING PROTECTION Metatarsal protection for saw cutting, jack hammering, and pressure washing	☐ AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO	☒ GLOVES nitrile/leather as required by task-specific critical actions of JSA ☒ OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS[1]	**POTENTIAL HAZARDS[2]**	**CRITICAL ACTIONS TO MITIGATE HAZARDS[3]**	
Mobilization, Equipment Lay Down, Boring/Well Markouts and Utility Clearance	Vehicular traffic	Reflective vests required	
		Use cones or other barricades as necessary	
		Be aware of traffic and site traffic patterns.	
	Underground Utilities	Contact Dig-Safe	
		Mark utility locations in the field prior to drilling	
		Coordinate with Lackawanna personnel and obtain approval for drilling locations	
	Adjacent Site Activities	Keep aware of any adjacent activities and traffic	
	Spray Paint	Keep can pointed away from face	
		Do not use damaged cans.	
		Wear gloves	
		Wear appropriate PPE (safety glasses/goggles) to prevent flying debris from causing eye or other injuries	

TABLE 1 (CONT.)
JOB HAZARD ANALYSES

AECOM USA, Inc. Lackawanna Incinerator Site	DATE 6/10/2022	☒ NEW ☐ REVISED	PAGE 2 of 4
WORK ACTIVITY (Description): **Groundwater Sampling**			
DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY:	POSITION/TITLE
Mike Gutmann	Project Manager	Kevin McGovern, CHMM	HSE Representative
		Peter Gregory, CSP, MPH, STS	RHSEM
TBD	Site Geologist (SSO)	TBD	SSO
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST ☒ HARD HAT ☒ SAFETY GLASSES ☒ PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO	☒ SAFETY SHOES Steel-toe ☒ HEARING PROTECTION Metatarsal protection for saw cutting, jack hammering, and pressure washing	☐ AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO	☒ GLOVES nitrile/leather as required by task-specific critical actions of JSA ☒ OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS[1]	**POTENTIAL HAZARDS[2]**	**CRITICAL ACTIONS TO MITIGATE HAZARDS[3]**	
Groundwater Sampling	Vehicular traffic	Reflective vests required	
		Use cones, caution tape, or other barricades as necessary	
		Be aware of traffic and site traffic patterns.	
	Chemical exposure to site contaminants (Lead and Arsenic) (dermal and inhalation)	Use appropriate and calibrated monitoring equipment including: PID, H2S monitor, particulate monitors, O2 sensors, LEL	
		Wear nitrile gloves (inner and outer), Tyvek and other PPE as necessary.	
		Adhere to action limits as specified in HASP	
	Hot/Cold Weather Exposure	Wear appropriate clothing	
		Take frequent warming breaks	
		Drink cool/hot liquids	
	Potential Electrical Hazards	If using extension cords and powered sampling equipment, check cords and equipment before use.	
	Injury during lifting	Lift with knees	
		Ask for assistance with heavy objects	
		Keep back straight and do not twist	
	Manage contaminated purge water and materials	Keep generation of excess contaminated purge water and materials to a minimum and manage according to work plan.	

TABLE 1 (CONT.)

JOB HAZARD ANALYSES

TABLE 1 (CONT.)

JOB HAZARD ANALYSES

AECOM USA, Inc. Lackawanna Incinerator Site	**DATE** **6/10/2022**	☒ **NEW** ☐ **REVISED**	**PAGE 3 of 4**
WORK ACTIVITY (Description): **Decontamination of Equipment**			
DEVELOPMENT TEAM	POSITION/TITLE	**REVIEWED BY:**	**POSITION/TITLE**
Mike Gutmann	Project Manager	Kevin McGovern, CHMM	HSE Representative
		Peter Gregory, CSP, MPH, STS	RHSEM
	Site Geologist (SSO)	TBD	SSO
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST ☒ HARD HAT ☒ SAFETY GLASSES ☒ PPE CLOTHING Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls). Tyvek® Saranex or equivalent.	☒ SAFETY SHOES Steel-toe ☐ HEARING PROTECTION ear plugs not required for personnel outside 30-ft safety zone or if operator's vehicle door and window is closed	☐ AIR PURIFYING RESPIRATOR required as specified in HASP Addendum and determined by SSO, OSHER or ASHEM	☒ GLOVES nitrile/leather as required by task-specific critical actions of JSA ☒ OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS	**POTENTIAL HAZARDS**	**CRITICAL ACTIONS TO MITIGATE HAZARDS**	
Decontamination of Equipment	Vehicular traffic	Set decontamination area away from traffic and coordinate with Lackawanna personnel.	
	Flying debris	Use safety glasses with a face shield and/or goggles	
	Chemical Exposure	Wear appropriate PPE (nitrile inner gloves, chemical resistant outer gloves, coated Tyvek).	
	Noise (>85 dB)	Hearing protection required.	
	Particulates	Implement engineering controls (wetting) if high levels of particulates are created.	
		Use PPE (polycoated Tyvek© coveralls, chemical-resistant overboots, nitrile outer gloves, and air purifying respirator) as directed by SSO.	
	Hot water and steam	If pressure washer is used, use goggles and face shield, and gloves. Keep wand pointed away from hands and face and other people.	
	Manage debris and wastewater appropriately	Keep debris generation to a minimum if possible. Manage in accordance with work plan.	

AECOM USA, Inc. Lackawanna Incinerator Site	DATE 6/10/2022	☒ NEW ☐ REVISED	PAGE 4 of 4
WORK ACTIVITY (Description): **Demobilization**			
DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY:	POSITION/TITLE
Mike Gutmann	Project Manager	Kevin McGovern, CHMM	HSE Representative
		Peter Gregory, CSP, MPH, STS	RHSEM
TBD	Site Geologist (SSO)	TBD	SSO
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)			
☒ REFLECTIVE VEST ☒ HARD HAT ☒ SAFETY GLASSES ☒ PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO	☒ SAFETY SHOES Steel-toe ☐ HEARING PROTECTION Metatarsal protection for saw cutting, jack hammering, and pressure washing	☐ AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO	☒ GLOVES nitrile/leather as required by task-specific critical actions of JSA ☒ OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS[1]	**POTENTIAL HAZARDS[2]**	**CRITICAL ACTIONS TO MITIGATE HAZARDS[3]**	
Demobilization	Vehicular traffic	Reflective vests required	
		Use cones or other barricades as necessary	
		Be aware of traffic and site traffic patterns.	
	Hot/Cold Weather Exposure	Wear appropriate clothing	
		Take frequent warming breaks	
		Drink cool/hot liquids	
	Adjacent Site Activities	Keep aware of any adjacent activities and traffic	

TABLE 2

CHEMICAL CONTAMINANTS OF CONCERN

Specific Contaminant Known or Suspected	PEL, or TLV (ppm)	IDLH (ppm)	Acute Effects	Ionization Potential (eV)	Appropriate Monitoring Instrument
Heavy Metals (major components)					
Lead (7439-92-1)	0.05 PEL 0.05 TLV	100 mg/m^3	Lassitude, insomnia, Facial pallor, tremor	N/A	Particulate monitor
Arsenic (7439-97-6)	0.52 TLV 0.5 PEL			N/A	

NOTES:

NS = No Standard
< = Less than
NIOSH = National Institute for Occupational Health and Safety
ppm = parts per million
eV = Electron Volt
H_2O = Water
PEL = Permissible Exposure Limit
REL = Regulatory Exposure Limit
TLV = Threshold Limit Value
IDLH = Immediately Dangerous to Life and Health
mg = milligrams
cu.m = cubic meters
NA = Not Applicable
C = Carcinogen
AC = Avoid contact with media

FIGURE 1

HOSPITAL AND CLINIC DIRECTIONS/MAPS

APPENDIX F – QUALITY ASSURANCE PROJECT PLAN

AECOM Environment

Prepared for:
Superfund Standby Program
NYSDEC
Albany, NY

Prepared by:
AECOM
Amherst, NY
October 2022

GENERIC QUALITY ASSURANCE PROJECT PLAN (QAPP)

LACKAWANNA INCINERATOR SITE
SITE #915206
LACKAWANN NEW YORK 14218
WORK ASSIGNMENT D009803.29

Prepared for:

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by:

AECOM USA, Inc.
One John James Audubon Parkway``
Amherst, New York 14228

GENERIC QUALITY ASSURANCE PROJECT PLAN (QAPP)

LACKAWANNA INCINERATOR SITE
SITE #915206
LACKAWANNA NEW YORK 14218
WORK ASSIGNMENT D009803.29

Prepared By: Robert Montione,
Quality Assurance Officer

Reviewed By: Michael Gutmann, PG

Contents

ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocol
°C	degrees Celsius
CLP	Contract Laboratory Program
COC	chain of custody
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Program
FAP	Field Activities Plan
FD	field duplicate
IDL	instrument detection limit
ITR	independent technical review
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MD	matrix duplicate
MDL	method detection limit
mg/L	milligrams per liter
mg/kg	milligrams per kilograms
MS	matrix spike
MSB	matrix spike blank
MSD	matrix spike duplicate
NEIC	National Enforcement Investigations Center
ng/L	nanograms per liter
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCB	polychlorinated biphenyl
PFAS	Per- and polyfluoroalkyl substances (PFAS)
PMWP	Project Management Work Plan
ppbv	parts per billion by volume
PQO	Project Quality Objective
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	relative percent difference
TCLP	toxicity characteristic leaching procedure
µg/kg	micrograms per kilograms
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
USEPA	United States Environmental Protection Agency
VTSR	validated time of sample receipt

1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPP) is to document planned investigative activities and establish the criteria for performing these activities at a predetermined quality for the work conducted completed by AECOM USA, Inc. (AECOM) under NYSDEC Standby Engineering Contract D009803.

Project work will be conducted in general accordance with the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010a), DER's Spill Response Guidance Manual, as applicable, technical requirements in Contract D009803 between NYSDEC and AECOM (NYSDEC and AECOM, 2019), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

The QAPP is intended to be a companion document to the site-specific Work Plan prepared for the work assignment.

1.2 PROJECT MANAGEMENT AND ORGANIZATION

1.2.1 Personnel

The general responsibilities of key project personnel are listed below.

Program Manager – Michael L. Spera, PE will have responsibility for overall program management and coordination of AECOM personnel and subcontractors to complete the work.

Project Manager – Michael Gutmann will have responsibility for overall project management and coordination with NYSDEC, and will coordinate the initiation and implementation of the work assignment activities. The AECOM Project Manager will serve as the initial and primary contact with NYSDEC throughout the project, and will be responsible for successful implementation of the project's QA/QC activities. The AECOM Project Manager may delegate a portion of the tasks required for successful implementation of the project to a qualified individual, the Site Manager, who will be on site during field activities (i.e., investigations, remedial action, operation and maintenance activities, etc.). The Site Manager will work under the direction of the AECOM Project Manager and will be responsible for implementing applicable QC procedures in the field and verifying that all other AECOM field personnel adhere to these procedures and perform all activities as described in the project work plans.

Task Leaders/Field Team Leaders – Sean Connelly and Kevin McGovern, will share the responsibility of implementing and coordinating the field and office project activities.

Program QA Officer – Mr. Robert Montione (AECOM) will serve as the Program Quality Assurance Officer (QAO) for work assignments issued under this contract. The QAO will be responsible for oversight of the data validation and laboratory subcontractors, as well as data usability reports.

The QAO will work with the AECOM database manager to assure that electronic deliverables provided by the laboratory are accurate and are formatted consistent with AECOM and NYSDEC requirements. The Program QAO may designate another qualified individual to serve as project QA officer to oversee the data-to-day quality assurance aspects of specific work assignments.

Project QA Officer – George Kisluk, the AECOM Project QA Officer is responsible for verifying that the analytical laboratories adhere to the QA/QC requirements specified in this Generic QAPP and the requirements identified in the site-specific addendum to this Generic QAPP. The AECOM QA Officer will be the point of contact for the Laboratory's Project Manager and will personally communicate with the Laboratory's Project Manager to verify that all sample analyses are being performed such that the resulting data will be of sufficient quality for its intended purpose.

H & S Officer – Mr. Peter Wray (AECOM) will be responsible for oversight of the preparation of the project health and safety plan, approving it, and tracking of its implementation.

Database Manager – Angela Toma-Eisele (AECOM), or an assigned qualified individual, will serve as database manager. The database manager is responsible for verifying that laboratory deliverables meet AECOM and NYSDEC electronic deliverable specifications, and for preparing the final EQuIS deliverable for submission to NYSDEC.

Resumes for AECOM personnel have previously been submitted to the Bureau of Program Management.

1.2.2 Specific Tasks and Services

AECOM has obtained the following subcontractor specialists for services relating to laboratory/analytical services and data validation services.

Laboratory Analysis – NYSDEC's Call-out (Pace Analytical) laboratory has been assigned for the project. The laboratory is certified for aqueous and non-aqueous matrices.

All laboratories to be used for the work assignment shall hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Copies of the applicable ELAP certifications for each laboratory to be used during the work assignment are provided in the site-specific addendum to this Generic QAPP. Each laboratory maintains its own QA/QC program and employs the required staff to implement this program. The QA Officer for each laboratory is responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, this Generic QAPP and the site-specific QAPP addendum.

Data Validation – A third-party data validator will be assigned for data quality review and Data Usability Summary Report (DUSR) preparation as needed for each project, selected from firms subcontracted by AECOM based on a solicitation conducted in 2020. As noted in the Standby Contract (D009803), independent third-party validation is preferred when data validation is required. Data validation is performed to establish the data quality for all data which are to be considered when making project decisions.

Field surveying and mapping- will be provided by Frandina Engineering.

1.3 SITE DESCRIPTION AND LOCATION

Background data on the site, including the site description and location, site history, previous investigations, and current conditions, are summarized in the site-specific Work Plan or Field Sampling Plan (FSP). A site map showing proposed sampling locations is included in the site-specific FAP.

2.0 SITE INVESTIGATION

Site investigation procedures are provided below.

2.1 FIELD SAMPLING PROCEDURES

Field activities are detailed in the Work Plan or FAP and are not repeated in the QAPP. Per- and polyfluoroalkyl substances (PFAS) sampling will follow the NYSDEC Part 375 guidance (January 2020) included in Appendix A of the Generic FAP.

2.2 EQUIPMENT DECONTAMINATION

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the procedures specified in the Work Plan or FAP.

The procedures discussed here are general and will be superseded by project-specific requirements (as documented in the Work Plan or FAP). However, these procedures are provided for guidance in developing those plans.

Field equipment rinsate blanks (see Section 4.3.1) are generated and analyzed to monitor the effective of field decontamination procedures.

Cross contamination is minimized by the use of vendor-decontaminated, dedicated, or disposable equipment to the extent practical.

2.2.1 Decontamination Procedures

For larger projects, and as indicated in the Work Plan or FAP, a decontamination pad may be constructed on the site. The pad will be appropriately sized and large enough to handle the equipment used on site (e.g., drill rig). The pad will also be used for small equipment decontamination as well as personnel decontamination.

2.2.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as sampling probes and cables, etc., will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse; and
- Distilled/deionized water rinse.

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g., Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute.

Equipment should be allowed to dry prior to use.

Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be placed in a large clean plastic garbage can filled with potable water and then

run for several minutes (to decontaminate both exterior and interior parts); submersible pumps will also be given a final analyte-free water rinse of both interior and exterior parts.

If bladder pumps are used, the pump will be disassembled and cleaned after each used. A new bladder will be used for each sample. Small parts, such as screens and gaskets will be replaced after each use. Dedicated air line tubing and sample tubing will be used at each monitoring well. The pump will be cleaned using the following steps:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;
- Solvent (reagent or pesticide grade) rinse if samples are collected for organic analysis;
- Dilute (10%) nitric acid rinse if samples are collected for metals analysis; and
- Distilled/deionized rinse, air dry.

2.2.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use during this project, between boreholes and prior to demobilization using high-pressure steam. Decontamination will be conducted at a dedicated decontamination pad constructed for the project or at an alternate location as indicated in the Work Plan or FAP. Decontamination fluids will be containerized (drummed) for subsequent characterization or disposal, unless other arrangements are made on a project-specific basis and as indicated in the Work Plan.

2.2.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the work plan, FAP, or Health and Safety Plan (HASP). This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

3.0 SAMPLE HANDLING

3.1 SAMPLE IDENTIFICATION AND LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. Sample identification and labeling requirements are presented in FAP Section 10 and are not repeated here.

The procedures discussed here are general and will be superseded by project-specific requirements (as documented in the Work Plan or FAP). However, these procedures are provided for guidance in developing those plans. Sample identification may be limited to a specific number of alphanumeric characters to be consistent with the limitations of the laboratory tracking/reporting software. The general sample identification format follows (other designations may be used to accommodate the requirements of specific projects). It should be noted that the field sample IDs shown below are not those required for the EQuIS deliverable; AECOM will coordinate with the analytical laboratory so that the sample types and codes are entered properly for each field and QC sample, and that the codes are consistent with the most recent NYSDEC Valid Values.

MW = Monitoring Well

FB = Field (Equipment Rinsate) Blank

TB = Trip Blank

XX = Numerical sample identifier (up to five characters). This will ordinarily be the number of the monitoring well or soil boring location from which the sample was obtained.

As part of the unique identifier, the sample date will be included following any location that may have more than one sample collected. The format will be MMDDYY. For example, MW-01S that is sampled on May 24, 2011 will be MW-01S_052411.

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original by adding 50 to the original well ID (e.g., MW-51S_052411 would be a field duplicate of MW-01S_052411). The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. As the field duplicates are blind to the laboratory, the NYSDEC Valid Value for a field duplicate (FD) along with the identification of the parent sample will be done by AECOM after the EQuIS deliverable is received from the laboratory.

Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink:

- Site name, location, and job number;
- Sample name;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment, air); and
- Requested analyses.

3.2 SAMPLE BOTTLES, PRESERVATION, AND HOLDING TIME

Section 3.2.2 identifies the sample preparation and analytical method, matrix, holding time, containers, and preservatives for the typical analyses to be performed under this contract. Sample bottle requirements, preservation, and holding times are discussed further below.

3.2.1 Sample Containers

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements and any regulatory protocol requirements.

Sample bottles will be provided by the analytical laboratory and will conform to the requirements of the USEPA Specifications and Guidance for Contaminant-Free Sample Containers.

3.2.2 Sample Preservation

Samples will be preserved as indicated below.

Aqueous Samples:

Metals – cooled to 4º C; HNO_3 added to pH ≤ 2.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. The pH of samples will be spot-checked in the field and additional preservative will be added as needed. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the AECOM Quality Assurance Officer (QAO). If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified, or additional preservative will be added in the field by the sampling team.

Non-Aqueous (e.g., soil and sediment) Samples:

No chemical preservatives are added to non-aqueous samples

3.2.3 Holding Times

Holding times are calculated from the time of sample collection; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection except for instances with shorter holding time parameters . Holding time requirements will be those specified in the analytical method.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

3.2.4 Sample Custody

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

3.2.4.1 Custody Definitions

Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the Project Manager (or his/her designee).

Under Custody - A sample is “Under Custody” if:

- It is in one's possession, or
- It is in one's view, after being in one's possession, or
- It was in one's possession and one placed it under lock, or
- It is in a designated secure area.

3.2.4.2 Responsibilities

The Project Manager will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform to following tasks:

- Review sample labels or tags, closure tapes, and COC records.
- Train all field sampling personnel in the methodologies for carrying out COC activities and the proper use of all COC and record documents.
- Monitor the implementation of COC procedures.
- Submit copies of the completed COC records to the Project Chemist.

A COC form will trace the path of sample containers from the project site to the laboratory. Chain-of-custody forms are typically provided by the analytical laboratory.

Sample bottle tracking sheets or the chain-of-custody will be used to track the containers from the laboratory to the containers’ destination. The Project Manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. Sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4º C. Synthetic (blue) ice packs shall not be used when sampling for PFAS. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing “Environmental Samples” and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

3.3 LABORATORY SAMPLE RECEIPT

Upon receipt at the laboratory, a laboratory representative inspects the samples for integrity and checks the shipment against the COC/analytical task order form. Discrepancies are addressed at this point and documented on the COC form and the cooler checklist (an example will be provided in each of the project-specific Field Sampling and Analysis Plans). Discrepancies are reported to the Laboratory Project Manager who contacts the AECOM Project Manager or QAO for resolution.

When the shipment and the COC are in agreement, the custodian enters the samples into the Laboratory Information Management System and assigns each sample a unique laboratory number. This number is affixed to each sample bottle. The custodian then enters the sample and analysis information into the laboratory computer system.

3.3.1 Laboratory Sample Custody

The laboratory must satisfy the sample chain-of-custody requirements by implementing the following procedures for laboratory/sample security:

- Samples are stored in a secure area
- Access to the laboratory is through a monitored area
- Visitors sign a visitor's log and are escorted while in the laboratory
- Only the designated sample custodians have keys to sample storage area(s)
- Transfers of samples in and out of storage are documented.

3.3.2 Sample Storage, Security, and Disposal

While in the laboratory, the samples and aliquots that require storage at 4°C ± 2°C are maintained in a locked refrigerator unless they are being used for analysis. The laboratory is responsible for sample storage and security so that:

- Samples and extracts are stored for 60 days after the final analytical data report has been submitted to AECOM. The samples, extracts, and digestates are then disposed by the laboratory in accordance with laboratory SOPs and applicable regulations.
- Samples are not stored with standards or sample extracts.

4.0 DATA QUALITY REQUIREMENTS

4.1 ANALYTICAL METHODS

Soil and water sample analyses for this contract will typically utilize USEPA SW-846 methods as listed below.

Analytical and extraction/sample preparation methods typically used are summarized below.

Target analyte list metals – SW-846 Method 6010B.

Analytical methods are presented in the NYSDEC Analytical Services Protocol (ASP), 2005 (February 2008 supplement for TO-15). It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it pertaining to New York State work. Full Category B deliverables will be required unless specified otherwise in specific work assignments or work plans.

4.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPP will be used in assessing the uncertainty associated with decisions related to this site.

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions.

More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

PQOs are provided in the site-specific QAPP addendum and in the project FAP.

4.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is based on the DQOs established for the project. The method detection limit is determined in accordance with the procedure

in ASP Exhibit A, Section 4.9.2.12, which is consistent with the procedure in 40 CFR Part 136 Appendix B.

The reporting limit (RL) for nondetected analytes will be the lowest calibration standard associated with the analysis. Reporting limits will be equal to or lower than those presented in Exhibit C of ASP 2005 for the applicable method. Analytes detected analytes at concentrations below the RL but above the MDL will be flagged "J" (estimated) by the laboratory.

The RLs and MDLs of the assigned laboratory will be reviewed by AECOM's QAO for each project to verify that the laboratory sensitivity is sufficient to meet the project objectives. These will typically include meeting the applicable standards, criteria, and guidance (SCGs) including soil cleanup objectives (6 NYCRR 375-6.8), supplemental soil cleanup objectives (NYSDEC, 2010b), groundwater and surface water criteria (compiled in TOGS 1.1.1), soil and water guidance for PFAS (NYSDEC 2020), and indoor air screening levels (NYSDOH, 2006, 2007).

4.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Matrix spike duplicate analyses will be performed once for every 20 samples.

Relative Percent Difference (RPD) criteria determined from laboratory performance data are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the RPD:

$RPD = 100 \times 2(|X_1 - X_2|) / (X_1 + X_2)$

where:

> X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is ≤ 50% RPD for all matrices for analytes detected at concentrations at least 2 times the RL. Where one or both analytes are detected at less than 2 times the RL, the criterion is the absolute difference "D" ($X_1 - X_2$), and D should be less than the RL for the analyte.

4.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent method recovery criteria and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike or laboratory control will be performed once for every analytical batch or as specified in the method or ASP. Other method-specific laboratory QC samples (such as continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

% Recovery = 100 × (SSR-SR)/SA

Where:

SSR = Spiked sample Result

SR = Sample Result, and

SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples. Accuracy values can be presented in a variety of ways. For projects under this NYSDEC contract, accuracy will be normally presented as percent recovery.

Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

% Recovery = (R/S) x 100

Where:

S = surrogate spike concentration

R = reported surrogate compound concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

4.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

4.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the US Environmental Protection Agency (USEPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;

- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

Comparability within any specific project is also assessed by comparison of the project data to data generated previously; and, if available, comparison of the data for multiple sampling events conducted for the project. Comparability (consistency) of sampling techniques is also assessed, to some extent, by analysis of field duplicates; although it should be noted that large differences between field duplicates may result from a wide variety of causes, not just inconsistent sampling.

4.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data for all planned samples. Completeness of 100 percent indicates that all planned samples were collected; and the resultant data were fully valid and acceptable. As completeness is a function of both field activities and laboratory activities, separate completeness goals are established for each.

The default goal for sampling completeness is 95 percent, as is calculated as

Sampling Completeness (%) = (Sc/Sp) × 100

Where:

Sc = Samples collected (submitted) for analysis (documented from field records or COC)

Sp = Samples planned (as documented in the FAP or QAPP)

The default goal for analytical completeness is also set at 95 percent. Analytical completeness may be less than 100 percent either due to systemic failures that result in the rejection or loss of data for an entire sample; or compound-specific rejection (e.g., 2-hexanone) within an otherwise valid analysis.

For typical work assignments, the default overall completeness goal is 90 percent usable data. The impact of rejected or unusable data will be made on a case-by-case basis. If the goals of the project can be achieved without the missing datum or data, or if data from a different sampling event can be used to fill the data gap, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

4.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be “demonstrated analyte-free.” The criteria for analyte-free water are based on the USEPA-assigned values for the Contract Required Quantitation Limits (CRQLs) for CLP analyses, or the RL for SW-846 or other methods.

However, specifically for the common laboratory contaminants (acetone and 2-butanone), the allowable limits are five times the CRQL (or RL). For methylene chloride, the limit is 2.5 times the CRQL. For common SVOC contaminants (phthalate esters such as bis(2-ethylhexyl) phthalate), the limit is 5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte-free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

4.3.1 Field Equipment (Rinsate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Rinsate blanks are not required when samples are collected directly into laboratory-provided sample containers (e.g., if specified as such in the FAP for matrices such as surface water or leachate seeps).

Field Equipment (Rinsate) blanks for bailers: For initial sampling, as well as at subsequent rounds of sampling when bailers are reused, at least one of the bailers used per decontamination batch, will be used to generate equipment (rinsate) blanks during groundwater sampling. Disposable bailers will be obtained from a single vendor for this project. One rinsate blank will be collected for each groundwater sampling event to verify that the vendor decontamination was adequate, and that contamination has not occurred during shipment and storage.

Typically, one rinsate blank will be collected for every 20 field samples collected or one per week, whichever is more frequent, for each type of sampling equipment. The rinsate blanks will be collected from the soil and groundwater sampling equipment. For PFAS sampling, equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected at a minimum frequency of one per day or one per twenty samples, whichever is more frequent.

Equipment blanks are not collected or submitted in association with air (Summa canister) samples.

4.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method.

Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day.

Soil duplicate samples are collected from a single location and device (e.g., split spoon sampler). Soil duplicates for VOC analysis are collected first, without homogenization. If other parameters are being analyzed, the remaining soil is homogenized (e.g., by mixing in a clean stainless steel bowl) and prior to generating the sample and duplicate.

Air field duplicates are typically collected by utilizing a “T” fitting on the sample line and splitting the air between two Summa canisters of the same size and set to the same flow rate.

The default field duplicate precision (RPD) objective is ≤50% percent RPD for all matrices where the sample concentration is at least two times the RL. Where the analyte is detected in both samples, but the concentration is less than 2 times the RL, precision is assessed by the absolute difference, which should be less than the RL. The RPD is not calculable when the analyte is not detected in one or both analyses. A more detailed discussion of the calculation is provided in Section 4.2.2 (Precision), above.

Field duplicates will be collected at a frequency of one per 20 environmental samples for aqueous analyses.

4.3.3 Split Samples

Split samples are used for performance audits or inter-laboratory comparability of data. Split samples may also be generated if a site owner or PRP requests them. A split sample will be defined as at least

two separate sub-samples taken from a single original sample which has been thoroughly mixed or homogenized prior to the formation of the split samples. The exception to this is samples for volatile organics analysis which will not be homogenized. Collection of split samples may be conducted only when specifically requested by NYSDEC.

4.3.4 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for VOC analysis.

Trip blanks are not needed for this SMP.

4.3.5 Temperature Blanks

The laboratory will use either an infrared instrument to measure the temperature of liquid samples, or a temperature blank will be used to measure the temperature of liquid samples. If used, temperature blanks will be supplied by the analytical laboratory. If multiple coolers are necessary to store and transport aqueous samples, then each cooler will contain an individual temperature blank (if used).

4.4 FIELD TESTING QC

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity) and turbidity are detailed below. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings. Calibration logs for the instruments discussed below will be provided in the work plan or FAP.

4.4.1 pH Meter

The pH meter is calibrated daily, using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by more than 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

4.4.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter daily. Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride (KCl) solutions in accordance with manufacturer's recommendations.

4.4.3 Turbidity

The turbidity meter should be calibrated using a standard as close as possible to 50 NTU (the critical value for determining effectiveness of well development and evacuation). The turbidimeter will be checked daily. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar).

4.4.4 Temperature

Temperature probes associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument temperature reading be checked against a NIST-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained.

4.5 LABORATORY QUALITY ASSURANCE

4.5.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every twenty samples analyzed or as otherwise specified in the analytical protocol.

4.5.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (except for volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a matrix spike and a matrix spike duplicate (MS/MSD) for volatile organics.

4.5.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: matrix spikes and matrix spike duplicates (MS/MSD), which are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD samples will be analyzed at a frequency of one (pair) for every 20 samples. In addition, matrix spike blanks (MSBs) will also be prepared and analyzed by the laboratory as required by NYSDEC ASP.

4.5.4 Laboratory Control Sample

A fortified clean matrix (laboratory control sample, or LCS) is analyzed with each analysis. In some cases, a “Laboratory-Fortified Blank” (LFB) may serve as the LCS. These samples generally consist of a standard aqueous or solid matrix fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The LCS may be analyzed in duplicate for some methods (LCSD). The analyte recovery from each analysis (LCS and LCSD) is used to monitor analytical accuracy; analytical precision can be assessed from evaluation of the LCS/LCSD in the same manner as the MS/MSD.

5.0 FIELD DATA DOCUMENTATION

Field reporting documentation, including field log books and field data reporting forms, is discussed in FAP Section 10; therefore, it is not repeated here.

6.0 EQUIPMENT CALIBRATION AND MAINTENANCE

Quality assurance for instrumentation and equipment used for a project is controlled by a formal calibration program, which verifies that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity, or whose performance is expected at a stated level, are subject to calibration. Calibration is performed using reference standards or externally by calibration agencies or equipment manufacturers.

6.1 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples typically includes a turbidimeter (turbidity per EPA Method 180.1), pH meter (pH per EPA Method 150.1), conductivity meter (specific conductance per EPA Method 120.1), thermometer, and photoionization detector. See also Section 4.4 of this QAPP for additional discussion.

The organic vapor analyzer (MultiRAE, or equivalent organic vapor analyzer) used for soil screening and health and safety air monitoring will be calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut off for more than two hours, and at the field technician's discretion.

6.2 LABORATORY EQUIPMENT CALIBRATION

Laboratory equipment will be calibrated according to the method-specific requirements of the 2005 NYSDEC ASP**,** Exhibit E, Parts II and III, and maintained following professional judgment and the manufacturer's specifications, and additional requirements as specified in the ELAP certification manual.

6.2.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from sources traceable to National Institute of Standards and Technology, or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the referenced methods referenced. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials Class 1 weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (e.g., 4°C ± 2°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Air Supply System – Laboratories performing air/soil vapor sample analyses must maintain a sufficient supply of analyte-free air for all project needs. The grade of air must be of the highest quality in order to eliminate false-positives from the analytical results. Appropriate documentation of the quality of the air supply system(s) will be performed on a regular basis by the laboratory.

6.2.2 Calibration Procedure

Written procedures are used for all instruments and equipment subject to calibration. For chemical analyses typically performed for these contracts, the calibration procedures are specified in the methods as compiled in the ASP. If established procedures are not available, a procedure is developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured.

6.2.3 Calibration Frequency

Calibration frequency is based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

6.2.4 Calibration Reference Standards

Two types of reference standards will be used by the standby laboratories for calibration:

Physical standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators and ovens, are generally used for periodic calibration.

Chemical standards, such as Standard Reference Materials (SRMs) provided by the National Institute of Standards and Technology (NIST) or USEPA, may also include vendor-certified materials traceable to NIST or USEPA SRMs. These are primarily used for operational calibration.

6.2.5 Calibration Failure

Equipment that cannot be calibrated or becomes inoperable is removed from service. Such equipment must be repaired and satisfactorily recalibrated before re-use. For laboratory equipment that fails calibration, analysis cannot proceed until appropriate corrective action is taken and the analyst achieves an acceptable calibration.

Laboratory managers are responsible for development and implementation of a contingency plan for major equipment failure. The plan includes guidelines on waiting for repairs, use of other instrumentation, subcontracting analyses, and evaluating scheduled priorities.

6.2.6 Calibration Records

Records are prepared and maintained for each piece of equipment subject to calibration. Records demonstrating accuracy of preparation, stability, and proof of continuity of reference standards are also maintained. Copies of the raw calibration data are kept with the analytical sample data.

6.3 OPERATIONAL CALIBRATION

Operational calibration is generally performed as part of the analytical procedure and refers to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Included are the preparation of a standard response (calibration) curve and often the analysis of blanks.

Preparation of a standard calibration curve is accomplished by the analysis of calibration standards, which are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards are chosen to cover the working range of the instrument or method. For most methods, five calibration standards are used, with the concentration of the lowest calibration standard being the reporting or quantitation limit for that analysis. Sample measurements are made and reported within this working range; apparent concentrations which exceed the high end of the calibrated range (“E”-flagged data for organic analyses) are diluted (or a smaller sample is used) and re-analyzed. The calibration curve is prepared by plotting or performing a linear regression of the instrument responses against the analyte concentration.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein and elsewhere in the Work Plan, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

7.1 LABORATORY DATA REPORTING AND REDUCTION

Data reduction is the process by which raw analytical data generated from laboratory instrument systems is converted into usable concentrations. The raw data, which may take the form of area counts, instrument responses, or observations, are processed by the laboratory and converted into concentrations expressed in the parts per million (milligrams per kilogram [mg/kg] or milligrams per liter [mg/L]), parts per billion (micrograms per kilogram [µg/kg] or micrograms per liter [µg/L]), or parts per trillion (ng/L) range. Raw data from these systems include compound identifications, concentrations, retention times, and data system print-outs. Raw data are usually reported in graphic form, bar graph form, or tabular form. The laboratory will follow standard operating procedures consistent with the data handling requirements of the applicable methods. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2005 revision of the NYSDEC ASP. ASP Deliverables are either Category B (full deliverables; similar to USEPA CLP requirements) or Category A (a reduced deliverable level). For this contract, Category B deliverables are the default and will be provided for all deliverables generated under the contract unless explicitly indicated otherwise on a site-specific basis. Laboratory data reports will conform to NYSDEC Category B deliverable requirements, as specified in Exhibit B, Part II.E, Sections 2 and 3, respectively.

Copies of the laboratory's generic Quality Assurance Management Plan (QAMP, as defined in ASP 2005 Exhibit E, Part I) will be maintained at AECOM's principal contact office (Latham, NY). The laboratory's QAMP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

To meet NYSDEC electronic data deliverable (EDD) requirements, laboratories subcontracted by AECOM for this work will be required to submit electronic deliverables in an EQuIS 4-file format consistent with AECOM standards. AECOM's database manager will be responsible verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel (or Access) file to the data validator; uploading the validated data into the database; overseeing the uploading of any other data (field data, boring log information, etc.), and submitting a final EQuIS deliverable to NYSDEC that meets NYSDEC EDD requirements.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form (submitted electronically). The data spreadsheet will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

7.2 DATA VALIDATION

As discussed in the Standby Contract (D009803), independent third-party validation is preferred when data validation is required. Data generated for work assignments under this contract will typically be validated by a third-party subcontractor (not affiliated with the laboratory or with AECOM). The validator, Validata Chemical Services, Inc., will follow guidelines established in the USEPA Region 2 SOPs applicable to the analytical method(s) being reviewed. These SOPs are checklists which are designed to formally and rigorously assess the quality and completeness of SW-846 analysis data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements). Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-10-011, January 2010, and the National Functional Guidelines for Organic Data Review, EPA-540-R-08-01, June 2008). For PFAS samples, Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids (NYSDEC 2020) shall be followed.

As discussed in the Standby Contract (D009803 – Attachment 1, Work Element V), a DUSR provides a thorough evaluation of analytical data without the costly and time-consuming process of third-party validation. The primary objective of a DUSR is to determine whether the data, as presented, meet the site-specific criteria for data quality and data use. Appendix 2B of NYSDEC's DER-10 provides guidance on data deliverables and development of a DUSR.

Validation reports and DUSRs will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text. Where QC failures caused the laboratory to perform a re-analysis, the data validator will make a recommendation as to which of the two analyses should be used. Data review will also include an assessment of sensitivity (i.e., are RLs appropriate to determine if contaminants are present at or above action levels or other applicable threshold values).

There may be some analyses for which there is no established USEPA or NYSDEC data validation protocol. In such cases, validation will be based on the Region 2 SOPs and EPA Functional Guidelines as much as possible, as well as the laboratory's adherence to the technical requirements of the method, and the professional judgment of the validator. The degree of rigor in such validation will correspond to the nature of the data and the significance of the data and its intended use.

7.3 DATA USABILITY

Subsequent to review of the items evaluated in the subcontractor data validator reports (DUSRs), AECOM's QA staff then prepares a brief data usability summary. The data usability summary, which will be provided as part of the project report, encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the

intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data and will also provide a subjective overall assessment of the data quality.

If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets.

The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

Data which has not been validated and field data used for the project will be discussed in the data usability summary, including any limitations on the use of such data.

7.4 FIELD DATA VERIFICATION

Field personnel will record all field data in bound field logbooks and on standard forms. After checking the validity of the data in the field notes, the Project Manager or his/her designee will reduce the data to tabular form, when possible, by entering the data into data files. Where appropriate, the data files will be set up for direct input into the project database. Subjective data will be filed as hard copies for later review by the Project Manager and incorporation into technical reports, as appropriate.

Verification of field data will be performed at two different levels. The first level of data verification will be performed at the time of collection by following standard procedures and QC checks. The second level of review consists of the Project Manager, Task Manager, or other competent personnel, reviewing the data to confirm that the correct codes and units have been included. After data reduction into tables and arrays is complete, the Site Manager will review data sets for anomalous values. The Project Manager, who will review field reports for reasonableness and completeness, will validate subjective field and technical data.

8.0 PERFORMANCE AND SYSTEM AUDITS

Audits are systematic checks to determine the quality of operation of some activity or function in the field or laboratory. Field audits are conducted to verify adherence to proper field and sampling procedures. Audits are of two types, as described below.

- Performance audits are independent safety and health, procedure, and/or sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process.
- System audits are onsite qualitative inspections and reviews of the QA system used by some part of or the entire measurement system. The audits are performed against the QAPP. A checklist is typically generated from the requirements and becomes the basis for the audit. The results of any deficiencies noted during the audit are summarized in an audit report.

Laboratory performance and system audits are performed by the laboratory's QA staff to assess the effectiveness of the quality system. These internal audits are performed on a routine basis. Audits are also performed by certifying agencies. Audit reports and corrective actions are available to NYSDEC for review.

8.1 RESPONSIBILITY, AUTHORITY, AND TIMING

QA audits to be conducted for the project may include system, performance, and data audits. The Project QA Officer will keep a tentative schedule on record that details the number and types of audits.

8.2 FIELD AUDITS

The need for field audits will be determined on a project-specific basis as required by the WA or in the approved work plans for the project. Not all the aspects listed below will be necessary or appropriate for projects for which field audits are specified.

Field performance audits, if specified, will be conducted during the project as field data are generated, reduced, and analyzed. Numerical manipulations, including manual calculations, will be documented. Records of numerical analyses will be legible, of reproduction quality, and sufficiently complete to permit logical reconstruction by a qualified individual other than the originator.

Indicators of the level of field performance include the analytical results of the blank and replicate samples. Each blank analysis will be considered an indirect audit of the effectiveness of measures taken in the field to maintain sample integrity (e.g., field decontamination procedures).

The results of the field replicate analyses are an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

System audits of site activities will be accomplished by an inspection of all field site activities. During this audit, the auditor(s) will compare current field practices with standard procedures. The following elements will be evaluated during a field system audit:

- Field activities conducted in substantial compliance with the Work Plan and FAP
- Procedures and analyses conducted according to procedures outlined in the QAPP and Addendum
- Sample documentation
- Working order of instruments and equipment
- Level of QA conducted by field personnel

- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding
- Decontamination procedures
- Level of efficiency with which each team conducts planned activities at one site and proceeds to the next
- Sample packaging and shipment.

After completion of the audit, any deficiencies will be discussed with the field staff and corrections identified. If any of these deficiencies could affect the integrity of the samples being collected, the auditor(s) will inform the field staff and corrections will be implemented immediately. The audit will be performed by the Project QA/QC Coordinator or the Site Manager.

8.3 LABORATORY PERFORMANCE AND SYSTEM AUDITS

As part of the laboratory subcontractor procurement process under the AECOM/NYSDEC Standby Engineering Contract, the laboratory assigned to this project will been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the matrices and analytical protocols to be used. Therefore, no project-specific audit of the laboratory(s) will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of AECOM and NYSDEC.

8.4 AUDIT PROCEDURES

Prior to an audit, the designated lead auditor prepares an audit checklist. During an audit and upon its completion, the auditor(s) will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated. The auditor will then prepare and submit an audit report to the manager of the audited group and the project manager.

The manager of the audited group will then prepare and submit, to the Project QA Officer and the Project Manager, a plan for implementing the corrective action to be taken on non-conformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files.

8.5 AUDIT DOCUMENTATION

A checklist will be completed during each audit so that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures. The checklist will detail the activities to be executed as part of the auditing plan. Audit checklists will be prepared in advance and will be available for review. Following each system, performance, and data audit, the auditor or QAO will prepare a report to document the findings of the specific audit.

9.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its quality management system (QMS) program, AECOM provides relevant excerpts and conclusions from data validation reports to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made in subsequent NYSDEC ASP work.

The objectives of the corrective action procedures presented below are to ensure that recognized errors in performance of sample and data acquisition lead to effective remedial measures and that those steps are documented to provide assurance that any data quality deficiencies are recognized in later interpretation and are not recurrent.

9.1 RATIONALE

Many times, corrective measures are undertaken in a timely and effective fashion but go undocumented. In other cases, corrective actions are of a complex nature and may require scheduled interactions between departmental groups. In either case, documentation in a formal or informal sense can reinforce the effectiveness and duration of the corrective measures taken.

9.2 CORRECTIVE ACTION METHODS

9.2.1 Immediate Corrective Actions

Immediate corrective actions are of a minor or routine nature such as correcting malfunctioning equipment, correction of data transcription errors, and other such activities routinely made in the field, laboratory, or office by technicians, analysts, and other project staff.

9.2.2 Long-Term Corrective Actions

Long-term corrective action will be used to identify and eliminate causes of non-conformances which are of a complex nature and that are formally reported between management groups.

9.2.3 Corrective Action Steps

For long-term corrective actions, steps comprising closed-loop corrective action system are as follows:

- Define the problem
- Assign responsibility for investigating the problem
- Investigate and determine the cause of the problem
- Determine a corrective action to eliminate the problem
- Assign and accept responsibility for implementing the corrective action

Verify that the corrective action has eliminated the problem.

Non-conformance events associated with analytical work are documented by the laboratories' Non-Conformance Records, which are reviewed and approved by the laboratory's Quality Assurance Manager.

9.2.4 Audit-Based Non-Conformances

Following audits, corrective action is initiated by documenting the audit finding and recommended corrective action on an Audit Finding Report.

9.3 CORRECTIVE ACTION REPORT REVIEW AND FILING

Immediate and long-term corrective actions require review to assure that, during the time of non-conformance, erroneous data were not generated or that, if possible, correct data were acquired instead. Such confirmation and review are the responsibility of the supervisor of the staff implementing the corrective action. Confirmation will be acknowledged by notation and dated signature on the affected data record or appropriate form or by memorandum to the AECOM QAO and Project Manager.

10.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Fundamental to the success of this QA/QC is the active participation of the Project Manager and the Project QA Officer. The Program QA Officer will be advised of project activities and will participate in development, review, and operation of the project. Project management will be informed of QA activities through the receipt, review, and/or approval of:

- Project-specific QA project plans
- Corporate and project-specific QA/QC plans and procedures
- Corrective action notices
- Non-conformance records.

Periodic assessment of field and laboratory QA/QC activities and data accuracy, precision, and completeness will be conducted and reported by the laboratory. Items to be included in the QA reports are the summary of results for the performance or the system audit and, where applicable:

- Assessment of adherence to work scope and schedule for the audited task
- Assessment of the precision, accuracy, and completeness of sample batches and subsequent status of data processing and analyses
- Significant QC problems and the status of any ongoing corrective actions
- Changes to the site-specific Work Plan
- Status of implementation of the site-specific Work Plan.

Monthly project status reporting to the NYSDEC will include aspects of quality control that were pertinent during the month’s activities. Problems revealed during review of the month’s activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The Project Manager will be responsible for verifying that records and files related to the work assignment are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

11.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC), 2005. *Analytical Services Protocol (ASP) Manual*. July.

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NYSDOH, 2007. Letter from Gary Litwin (Director) to Dale Desnoyers (NYSDEC DER) re: Soil Vapor/Indoor Air Matrices. (Adds additional chlorinated VOCs to the original matrices in the 2006 SVI guidance). June 25.

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USEPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. USEPA Office of Emergency and Remedial Response. OSWER Directive No. 355.3-01. October.

APPENDIX G - SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g., natural gas (cf))		
Fuel Type 2 (e.g., fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g., solar, wind)		
Other energy sources (e.g., geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e., Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

AECOM

Americas

Task Hazard Assessment

S3AM-209-FM6

Date:	**Project Name / Location:**
Permit / Job Number:	**Project Number:**
Description of Task:	

Do you have a pre-job hazard assessment (JHA) specific to this task in your hands?

- **Yes** – review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentified on JHA.
- **No** – list all steps, hazards, and precautions associated with the task in the form below.

Basic Task Steps (explain in order how the task will be carried out)	**Hazards** (identify all hazards & potential hazards of each step)	**Risk** (before)	**Control Measures / Precautions** (describe how that hazard will be controlled)	**Risk** (after)	**Revised?** (yes – record time)
			Highest Risk Index		

The Task Hazard Assessment is to be completed at the worksite by the individual(s) who is intended to conduct the task immediately prior to initiating the associated task. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document. Originator to also sign Worker acknowledgement section.

Originator _____ (Print Name) _____ (Signature)

Supervisor _____ (Print Name) _____ (Signature)

Risk Matrix on Reverse

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

WORKER SIGN ON

NAME (Please Print) TIME SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

Task Hazard Assessment Follow-Up/Review

Initials/Time	Initials/Time	Initials/Time

Instructions:
Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should **STOP WORK** on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

VISITOR SIGN ON

I have read and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Emergency Contact #

Method of Communication

Risk Rating Matrix

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

CHAIN OF CUSTODY RECORD

AECOM

PROJECT NO. | SITE NAME

SAMPLERS (PRINT/SIGNATURE)

LAB _____

COOLER _____ of _____

PAGE _____ of _____

DELIVERY SERVICE: _____ AIRBILL NO.: _____

TESTS

BOTTLE TYPE AND PRESERVATIVE

LOCATION IDENTIFIER	DATE	TIME	COMP/ GRAB	SAMPLE ID	MATRIX	TOTAL NO. # OF CONTAINERS	REMARKS	SAMPLE TYPE	BEGINNING DEPTH (IN FEET)	ENDING DEPTH (IN FEET)	FIELD LOT NO.# (IRPIMS ONLY)

MATRIX CODES

AA - AMBIENT AIR; SE - SEDIMENT; SH - HAZARDOUS SOLID WASTE; SL - SLUDGE; WP - DRINKING WATER; WW - WASTE WATER; WG - GROUND WATER; SO - SOIL; DC - DRILL CUTTINGS; WL - LEACHATE; GS - SOIL GAS; WC - DRILLING WATER; WO - OCEAN WATER; WS - SURFACE WATER; WQ - WATER FIELD QC; LH - HAZARDOUS LIQUID WASTE; LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK; SD# - MATRIX SPIKE DUPLICATE; RB# - RINSE BLANK; FR# - FIELD REPLICATE; N# - NORMAL ENVIRONMENTAL SAMPLE; MS# - MATRIX SPIKE

(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME

SPECIAL INSTRUCTIONS

Distribution: Original accompanies shipment, copy to coordinator field files

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

SITE: LACKAWANNA INCINERATOR SITE
COMPANY:

Project: _____ Site: _____ Well I.D.: _____

Date: _____ Sampling Personnel: _____ Company: _____

Purging/ Sampling Device: _____ Tubing Type: _____ Pump/Tubing Inlet Location: Screen midpoint

Measuring Point: Below Top of Riser Initial Depth to Water: _____ Depth to Well Bottom: _____ Well Diameter: _____ Screen Length: _____

Casing Type: _____ Volume in 1 Well Casing (liters): _____ Estimated Purge Volume (liters): _____

Sample ID: _____ Sample Time: _____ QA/QC: _____

Sample Parameters: _____

PURGE PARAMETERS

TIME	pH	TEMP (°C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	**0.1**	**---**	**3%**	**10%**	**10%**	**+ or - 10**	**---**	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft; 1 inch diameter well = 154 ml/ft; 2 inch diameter well = 617 ml/ft; 4 inch diameter well = 2470 ml/ft ($vol_{cyl} = \pi r^2 h$)

Remarks:

MONITORING WELL INSPECTION FORM

SITE: LACKAWANNA INCINERATOR SITE

COMPANY:

SITE NAME: _____

JOB#: _____

DATE: _____

TIME: _____

WELL ID: _____

INSPECTOR (PRINT): _____

EXTERIOR INSPECTION CONDITION

PROTECTIVE CASING/ CURB BOX: _____

LOCK/HASP CONDITION: _____ LOCK KEY #: _____

HINGE/ LID: _____ GASKET/SEAL : _____

SECURITY BOLTS TYPE: _____

SECURITY BOLTS : _____ THREAD CONDITION: _____

WELL PAD: _____ BOLLARDS: _____

LABEL/ ID CONDITION: _____

MAINTENANCE PERFORMED (e.g., anti seize applied, re-tapping bolt holes, bolt replacement, gasket replacement, etc.)

INTERIOR INSPECTION CONDITION

WELL CASING INTERIOR: _____

WELL RISER: _____

ANNULAR SPACE: _____

J PLUG: _____

WATER LEVEL: _____ DEPTH TO BOTTOM: _____

HARD/SOFT BOTTOM: _____

MAINTENANCE PERFORMED (e.g., removed water, removed bentonite, sorbed sheen, replaced J plug, etc.)

ADDITIONAL COMMENTS:

INSPECTOR (SIGNATURE): _____

PROJECT MANAGER APPROVAL: _____

ANNUAL SITE INSPECTION FORM

SITE: LACKAWANNA INCINERATOR SITE
COMPANY:

Inspected by: _____ Date: _____

SBL #	Current Site Owner	Current Property Use & Comments
Section 142.14 Block 1 Lot 4.1		
Section 142.14 Block 1 Lot 5.112		

APPENDIX H – FIELD ACTIVITIES PLAN

AECOM Environment

Prepared for:
Superfund Standby Program
NYSDEC
Albany, NY

Prepared by:
AECOM
Amherst, NY
October 2022

Field Activities Plan (FAP)

LACKAWANNA INCINERATOR SITE
SITE #915206
LACKAWANNA, NEW YORK 14218
WORK ASSIGNMENT D009803.29

Prepared for:

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Contents

List of Appendices

1.0 Introduction

This Field Activities Plan (FAP) is designed to provide typical procedures for the field activities performed as part of the Site Management at the Lackawanna Incinerator Site. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in those sections of this document, all personnel performing field activities must do so in compliance with: (1) the Quality Assurance/ Quality Control (QA/QC) measures outlined in the Quality Assurance Project Plan (QAPP); (2) the appropriate Health and Safety guidelines found in the Health and Safety Plan (HASP); (3) the scope of work outlined in the WAs; and (4) the time schedule outlined in the SMP.

1.1 Work Assignment Objectives

The objectives of the work assignment will be established in the SMP.

Field activities are planned and conducted in general accordance with NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010), the United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

The FAP is intended to be a companion document to the site-specific SMP and included as an appendix to the SMP to address site-specific conditions and project-specific requirements.

1.2 Site Description and Background Information

Available site information is presented in the Lackawanna Incinerator Site SMP. Information presented in the SMP includes, to the extent available and relevant, the following:

- Site Description
- Site Location
- Site History
- Previous Investigations, Remedial Actions, and Reports
- Record of Decision
- Current Site Conditions
- Local and Regional Geology and Hydrogeology
- Any other relevant information

2.0 General and Preparatory Field Activities

The scope of work is established in the Lackawanna Incinerator SMP.

The SMP may include a variety of field activities intended to obtain site-specific data pertaining to the extent of contamination and the extent to which releases or potential releases from the site pose a threat to human health and the environment. Typical project objectives include: long-term groundwater monitoring and adherence to SMP requirements.

To accomplish these objectives, the field subtasks described in this FAP may be utilized. Additional methodology information will be provided in the QAPP. Unless otherwise noted, it is assumed that all field work will be completed at Level D personal protection in accordance with the HASP. Field activities will be monitored by a qualified AECOM representative(s).

2.1 Mobilization

Following authorization to proceed with the field investigation from NYSDEC, AECOM and its subcontractors will mobilize necessary materials and equipment to the site. If the project involves intrusive work (e.g., monitoring well installation/decommissioning, soil borings, test pits), a call will be placed to DigSafely New York and will be the responsibility of the subcontractor performing the intrusive work. Utility clearance is detailed in Section 2.3.

The SMP will describe the provisions made for providing all necessary facilities and material, independent of the site owners/occupants. For small work assignments and those of short duration, it may be possible to mobilize and store the necessary materials in a vehicle (e.g., cargo van). For larger projects, mobilization may include establishing a site trailer, temporary sanitary facilities and the construction of a temporary decontamination pad that will remain in place during the field effort. If appropriate to the project, a drum storage area will be established for the temporary storage of investigation derived waste, including soil cuttings, monitoring well development water, decontamination fluids and purge water from groundwater sampling. Soil cuttings may be temporarily stored in drums or roll-off containers.

A project kick-off meeting will be held prior to initiating field work to orient field team members and subcontractors with the site and to familiarize all site workers with site background, potential dangers, health and safety requirements and emergency contingencies and other field procedures.

2.2 Health and Safety

It is anticipated that the work to be completed at typical sites will be performed in Level D personal protection with the potential to upgrade to Level C. Field workers will be instructed to keep Level C equipment available should it be needed. Should health and safety monitoring during field activities

indicate a threat to field personnel or warrant an upgrade beyond Level C protection, work will stop, and site conditions will be re-evaluated by NYSDEC and AECOM. An upgrade to Level B protection will require modification of the HASP and review by AECOM's regional safety manager.

The site-specific HASP will be submitted concurrently with the site-specific Work Plan, site-specific FAP, and site-specific QAPP.

2.3 Utility Clearance: Callout

Intrusive activities that may be conducted during a typical site investigation include soil borings, monitoring well installations, and test pit excavations. Prior to the start of intrusive activities, a call will be placed to New York DIG SAFE CALL CENTER at Dig Safely New York (for all areas north of New York City) 811 (http://www.digsafelynewyork.com) or 1-800-962-7960; for New York City and Long Island, 811 or 1-800 272-4480 for utility markouts to minimize the risk of encountering subsurface utilities. Site personnel will be contacted to determine if detailed utility plans are available for the Site.

2.4 Utility Clearance: Vac-Tron®

Excavation with a Vac-Tron® unit allows for excavation near subsurface utilities with reduced chance of impacting the utilities.

Procedure:

1. Excavate a two-foot square by approximately five-foot deep area manually using post-hole diggers, pry bars, soil knifes, and/or hand digging, along with the Vac-Tron® unit.

2. After the location is cleared for drilling, the hole will be backfilled flush with the sidewalk using the excavated spoils (small rocks and debris removed) and if necessary, temporarily patched with blacktop patch or concrete.

3. Excavated material not returned to the hole will be drummed along with the monitoring well boring spoils for proper disposal.

2.5 Community Air Monitoring

Community air monitoring will be performed as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), unless it is determined by NYSDEC that a site-specific air monitoring plan is required, or that some of the provisions of the CAMP are not appropriate for a specific work assignment. AECOM's approach to implementing the Generic CAMP is provided in Section 9.0 of this FAP.

2.6 Site Survey

Project surveying will provide data necessary to plot groundwater monitoring wells, piezometers, and soil-gas monitoring well locations on the existing base map. All surveying will be performed under the supervision of a New York State licensed land surveyor, following the requirements of the Scope of Work and HASP.

The horizontal positions will be tied into the North American Datum 1983 and UTM Zone 18N coordinate system. The vertical positions will be tied to the North American Vertical Datum 1988 (NAVD88). The measuring point associated with the existing monitoring wells or other site reference features will be recorded to a vertical accuracy of 0.01 ft. The final survey will be supplied in a digital CAD format (i.e., .dwg or .dxf files in the cited coordinate systems).

2.7 Green and Sustainable Remediation

The work to be completed will comply with NYSDEC guidance documents including DER-31: Green Remediation (2010b). To ensure compliance with DER-31, the work will be completed using the best management practices (BMPs) and techniques described below. In addition to the items discussed in Section 10.0 – Field Records and Documentation, specific reporting methods relative to DER-31 are further described in the following subsection.

2.7.1 Best Practices and Techniques

DER-31 provides some examples of BMPs that could be applied during all phases of remediation (see Attachment 1 of the DER-31 policy). Additional resources to identify potential BMPs and techniques applicable to this work include:

- United States Environmental Protection Agency CLU-IN Green Remediation (www.clu-in.org/greenremediation/);
- Interstate Technology & Regulatory Council Green and Sustainable Remediation (www.itrcweb.org/teampublic_GSR.asp);
- NAVFAC Green and Sustainable Remediation (www.ert2.org/t2gsrportal/);
- Air Force Center for Engineering and the Environment Sustainable Remediation (www.afcee.af.mil/resources/technologytransfer/programsandinitiatives/sustainableremediation/index.asp); and
- Sustainable Remediation Forum (www.sustainableremediation.org).

Lastly, NYSDEC expects that the BMPs identified below will be implemented at sites unless a site-specific evaluation demonstrates impracticability or favors an alternative green approach:

- Use renewable energy where possible or purchase Renewable Energy Credits (RECs);
- Use of remediation technologies with an intermittent energy supply (i.e., energy use during peak energy generation only);
- Incorporate green building design;
- Reuse existing buildings and infrastructure to reduce waste;
- Reuse and Recycle construction and demolition (C&D) debris and other materials (i.e., grind waste wood and other organics for on-site use);
- Design cover systems to be usable (i.e., habitat or recreation);
- Reduce vehicle idling;
- Use of Low Sulfur Diesel Fuel (LSDF) or alternate fuels (i.e., biodiesel or E85);

- Sequence work to minimize double-handling of materials; and
- Use energy efficient systems and office equipment in the job trailer.

Prior to initiating any field work, the Project Manager will identify applicable BMPs to be used for each work assignment. At a minimum, each BMP identified above will be included in the site-specific work plan with a discussion of how each practice or technique will be implemented or why a practice or technique is not appropriate to the work anticipated at the site.

2.7.2 Reporting

All Green and Sustainable BMPs employed during field activities will be discussed within the field log books described in Section 7.0 – Field Records and Documentation. Specifically, the field log books will acknowledge that the practices and techniques identified for the site work were taken each day (if applicable). In addition, the following information will be recorded within the field log books at the close of each day:

- The estimated quantity of fuel consumed by onsite vehicles and equipment;
- The estimated distance traveled by trucks and equipment delivering goods or removing waste; and
- The estimated water use during onsite activities.

The information will be compiled and presented to NYSDEC in a form suitable to the site-specific work completed.

3.0 Drilling/ Coring Procedures

Drilling/ coring activities which may be typically conducted include hollow-stem auger (HSA) drilling, Rotosonic drilling, NX-rock coring, wash/mud rotary drilling and air rotary drilling. Procedures for these activities are described below.

3.1 Hollow-Stem Auger Drilling Procedures

A standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1. HSAs, drill rods, and the drill rig will be thoroughly decontaminated prior to initial borehole installation and between each borehole at the centralized decontamination area. All decontamination liquids will be collected and placed in DOT-approved 55-gallon drums.

4. The drill rig will be inspected for oil leaks and any leaks reported prior to starting drilling operations.

5. Advance the boring by rotating and advancing the HSAs to the desired depth. The borings will be advanced incrementally to permit continuous or intermittent subsurface soil sampling, as required.

6. Remove center plug from the HSAs and collect a split spoon sample per the method stipulated by the project geologist or hydrogeologist.

References: American Society for Testing and Materials (ASTM) D1452/D1452M-16.

4.0 Groundwater Investigation Tasks

Groundwater investigations are typically part of a site investigation. Field activities which may be implemented as part of a groundwater investigation include (but are not limited to) the following:

- Existing Well Condition Survey
- Groundwater Elevation Survey
- Direct Push Groundwater Sampling
- Monitoring Well Installation
- Monitoring Well Development
- Groundwater Sampling from Monitoring Wells
- Aquifer Properties Testing (hydraulic conductivity “slug” testing)
- Aquifer Properties Testing (pumping test)

When sampling for PFAS, see Appendix A for special field procedures.

4.1 Monitoring Well Inspection and Maintenance

For some projects, an assessment of the condition and subsequent maintenance of existing monitoring wells may be necessary. As monitoring wells may have been installed over an extended period and by different organizations, the available data varies and in some cases is contradictory. It is possible that some of the wells can no longer be found. In addition, the condition of the wells (and suitability for sampling) may not be known. Therefore, prior to initiating any sampling at the site, an initial well condition survey may be conducted if requested by NYSDEC; or if determined to be appropriate by AECOM and with NYSDEC concurrence. The following procedure should be employed whenever the monitoring wells are opened for gauging and sampling:

1. Use the Monitoring Well Inspection Form (Appendix B) to record the conditions of the various components of the monitoring well and protective casing including lock/hasp, hinge/lid, J-plug, gasket seal, and security bolts.

2. Coat security bolts with never seize to prevent seizure in the cast iron flush mount curb boxes.

3. In wells, record depth to water, depth to bottom, and depths to the top and bottom of any light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) layers.

4. Record any maintenance performed on the well and stencil as needed.

5. All sections of the inspection form should be completed, and photographs taken before and after inspection and maintenance.

4.1.1 Road Box Replacement Procedures

Often during an inspection, it is determined that a monitoring well's road box is damaged and needs to be replaced. The following procedure should be employed whenever a road box is replaced:

1. Cut the pavement with a jackhammer and hand-excavate the surrounding soil to a depth of approximately 1 ft. below ground surface (bgs). If the surrounding surface is covered with asphalt instead of concrete, then hand cut the asphalt.

2. Any concrete (or asphalt) cuttings will be placed in a 1A2 open head 55-gallon steel drum.

3. Remove the damaged road box and install the new road box. The damaged road box will be placed in a 1A2 open head 55-gallon steel drum.

4. Backfill around the newly installed road box with the excavated soil, leaving enough room for a concrete pad/asphalt patch.

5. Construct a 2 ft. by 2 ft. square concrete pad/asphalt patch surrounding the new road box.

6. If using concrete in freezing temperatures, an anti-freeze agent will be added to the cement mixture and the concrete pad will be covered with a sheet of plastic to prevent the pad from freezing and cracking.

7. An orange cone will be placed near the monitoring well to prevent vehicles from driving over the newly repaired road box.

8. The drums will be addressed in accordance with the protocols outlined in Section 8.2.

4.2 Groundwater Elevation Survey

In order to better understand the hydrogeologic conditions, one or more rounds of synoptic water level readings may be collected by AECOM. A groundwater elevation survey may be taken as an initial task (e.g., concurrent with the existing well condition survey), or it may be performed at the conclusion of a well installation program, or both. Elevation surveys may be taken over several years, over several times of year to assess seasonal factors, or multiple times in a day to assess tidal or diurnal cycles which may influence groundwater elevations and flow directions.

Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic water level indicator. Initially, measurements will be taken following well development until the well has recovered to anticipated static conditions. Water levels will also be measured in the piezometers as specified in the Project Management Work Plan. Water level measurement procedures are presented below.

Procedure:

1. Clean the water level probe and the lower portion of cable following standard decontamination procedures (Section 8.1) and test water level meter to ensure that the batteries are charged.

2. Lower the probe slowly into the monitoring well until the audible alarm indicates water.

3. Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference point.

4. Repeat the measurement for confirmation and record the water level.

5. Remove the probe from the well slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.

6. Replace the well cap and lock protective cap in place.

7. Decontaminate the water level meter (Section 8.0) if additional measurements are to be taken.

Reference: ASTM D4750-87(2001).

4.3 Groundwater Sampling from Monitoring Wells

Groundwater sampling will be performed to evaluate the extent of groundwater contamination. The rationale, locations, wells, and analytical parameters will be specified in the site-specific Work Plan or FAP and QAPP addenda.

4.3.1 Standard Monitoring Well Purging Procedure

Unless specified otherwise in the site-specific Work Plan and approved by NYSDEC, groundwater sampling procedures are described below.

Procedure:

1. The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.

2. Using an electronic water level detector, the water level below top of casing will be measured. Knowing the total depth of the well, it will be possible to determine the volume of water in the well. The end of the probe will be soap-and-water-washed and deionized-water-rinsed between wells.

3. Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

4. Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity). New dedicated equipment will be used for each well.

5. Purge well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full scale range; pH - 0.10 pH unit; temperature - 0.2°C, and turbidity <50 NTU.

6. Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

7. Indicator parameters of pH, conductivity, dissolved oxygen, oxygen/reduction potential, turbidity, and temperature must be measured continuously using the flow cell.

8. Well purging data are to be recorded in the field notebook and on the Well Purge Log (Appendix B).

9. Dispose of sampling equipment as per Section 8.2.

4.3.2 Low-Flow Sampling Technique

Unless specified otherwise in the site-specific Work Plan and approved by NYSDEC, groundwater sampling will be done in accordance with *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers* (USEPA OSWER 542-S-02-001). The default groundwater sampling method will be in accordance with EPA's low stress (often referred to as low flow) sampling technique (EPA, 1998).

Monitoring well purging will be completed using the low-flow purging technique as follows:

1. The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.

2. Using an electronic interface probe/water level detector, the water level below top of casing will be measured. The depth of the well will be measured to determine the volume of water in the well. The bottom of the well will also be checked for DNAPL using the interface probe/water level indicator. The end of the probe will be decontaminated between wells.

3. Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

4. Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity) using a low-flow pump (e.g., Solinst or Geopump) and dedicated HDPE tubing. New dedicated tubing will be used for each well.

5. Purge the well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full-scale range; pH - 0.10 pH unit; dissolved oxygen – 10%, Turbidity – 10% and oxidation/reduction (redox) potential - +/- 10 units.

6. Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

7. Indicator parameters of pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, turbidity, and temperature must be measured continuously using the flow cell.

8. Well purging data are to be recorded in the field notebook and on the Low Flow Purge Log (Appendix B).

4.3.3 Sample Collection Procedures

Procedure:

1. After well purging is completed, a sample will be collected into the appropriate containers.

2. Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.

3. All sample bottles will be labeled in the field using a waterproof permanent marker (Section 10.4).

4. Samples will be collected into sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.

5. Remove pump and disconnect valves and tubing, as necessary. If a submersible pump was used, it must be decontaminated prior to and between each use. Clean pump by flushing 10 gallons of potable water through the pump. Rinse with deionized water after flushing the pump.

6. Well sampling data are to be recorded in the field notebook and on the Well Purging Log (Appendix B).

4.4 Monitoring Well Decommissioning

Monitoring well decommissioning will be performed in accordance with NYSDEC Policy CP-43, using the following steps:

1. Each well will be tremie grouted from the bottom of the well to within five feet of the ground surface to ensure a continuous grout column. Grout slurry composition should be the following:

    a. 1.5 to 3.0 percent by weight - Bentonite (Quick Gel)

    b. 40 to 60 percent by weight - Cement (Portland Type I)

    c. 40 to 60 percent by weight - Water

2. The well casing will be removed at a depth of five feet below grade (if possible) and the outer protective casing "stick-up" and/or flush-mount curb box will be removed only after the well has been properly filled with grout.

3. A metal marker (PK Survey Spike) will be embedded in the top of the grout to indicate the location of the former monitoring well.

4. The uppermost five feet of the borehole will be filled with approved/clean backfill or topsoil.

5. The surface of the borehole will be restored to the condition of the area surrounding the borehole (crushed stone, asphalt, etc.). If the surrounding surface is a concrete sidewalk flag, that flag will be replaced in accordance with applicable regulations/standards.

6. The solid waste should be handled is accordance with Section 8.2 of this plan.

7. Document well construction details in the field notebook and transfer the data onto the Well Decommissioning Record form (Appendix B).

Reference: ASTM D5299/D5299M-18

Reference: NYSDEC CP-43: *Groundwater Monitoring Well Decommissioning Policy*, November 3, 2009.

4.5 Plugging/Abandoning Borehole and Grout Mixing

Boreholes that are not completed as monitoring wells, will be sealed (plugged) prior to abandonment to prevent downhole contamination. In addition, the annular space in monitoring wells need to be sealed after the installation of the sand pack and bentonite seal to prevent any downward migration of surface water into the well. Sealing can be achieved by backfilling the borehole with bentonite below the water table (hole plug or pellets) and/or with a cement/bentonite grout above the water table. The backfill material will be introduced from bottom to top using either a tremie pipe or the drill rods. Shallow borings will be sealed with bentonite (hole plug or pellets) the entire length of the boring.

Procedure:

1. Determine most suitable seal materials. Grout specifications generally have mixture ratios as follows:

   Grout Slurry Composition (Percent Weight)

   1.5 to 3.0 percent - Bentonite (Quick Gel)

   40 to 60 percent - Cement (Portland Type I)

   40 to 60 percent - Water

2. Calculate the volume of the borehole based on the bit or auger head diameter plus 10 percent and determine the volume of grout to be emplaced. Generally, the total mixed volume is the borehole volume plus 20 percent.

3. Identify the equipment to be used for preparing and mixing of the grout. Ensure the volume of the tanks to be used for mixing has been measured adequately. Document these volumes.

4. Identify the source of the water to be used for the grout and determine its suitability for use. In particular, water with high sulfate or chloride levels, or heated water, should not be used. These types of waters can cause operational difficulties or modify the set-up for the grout.

5. Identify the equipment to be used for emplacing the grout. Ensure that the pump to be used has adequate pressure to enable complete return to surface.

6. Identify the volumes to be pumped at each stage or in total if only one stage is to be used.

7. Prepare the borehole plugging plan and discuss the plan and activities with the drilling contractor prior to beginning any mixing activities.

8. Begin mixing the grout to be emplaced.

9. Record the type and amount of materials used during the mixing operation. Ensure that the ratios are within specification tolerance.

10. Begin pumping the grout through the return line bypass system to confirm that all pump and surface fittings are secure.

11. Initiate downhole pumping. Record the times and volumes emplaced on the form.

12. Document the borehole is completely filled with grout.

13. Clear and clean the surface near the borehole. Level the ground to about the pre-existing grade. Add grout or cement as necessary to the area near the borehole.

Note: On occasion, there may be some settling of the grout, which takes place over several days. If this settling occurs, the natural soil from the immediate vicinity is used to put the level at grade. A follow-up check at each site should be made within one week to 10 days of completion. Document the visit and describe any action taken.

5.0 Decontamination and Management of Investigation Derived Waste

5.1 Equipment Decontamination

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures specified in the site-specific Work Plan or FAP; the procedures discussed here are general and may be superseded by project-specific requirements (as documented in the site-specific Work Plan or site-specific FAP). Field equipment rinsate blanks are generated and analyzed to monitor the effective of field decontamination procedures.

Cross contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

When sampling for PFAS, see Appendix A for special field procedures.

5.1.1 Decontamination Procedures

For larger projects, and as indicated in the site-specific Work Plan or site-specific FAP, a decontamination pad may be constructed on the site. The pad will be sized to be large enough to handle the equipment used on site (e.g., drill rig). Additionally, the pad will be used for small equipment decontamination as well as personnel decontamination.

5.1.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as Geoprobe® HydroPunch® samplers, transducer probes and cables, will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g. Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute.

Equipment should be allowed to dry prior to use. Steam cleaning or high-pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

Electric submersible pumps (such as a Grundfos Redi-Flow II) will be decontaminated using the above steps followed by running a large volume (several gallons) of potable water through the pump, followed by an analyte-free water rinse. Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be placed in a plastic bucket filled with Liquinox and potable water and then run for several minutes (to decontaminate both exterior and interior parts). The process will be repeated with potable water. Submersible pumps will also be given a final analyte-free water rinse of both interior and exterior parts.

If bladder pumps are used, the pump will be disassembled and cleaned after each used. A new bladder will be used for each sample. Small parts, such as screens and gaskets will be replaced after each use. Dedicated airline tubing and Teflon sample tubing will be used at each monitoring well. The pump will be cleaned using the following steps:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;
- Solvent (reagent or pesticide grade) rinse if samples are collected for organic analysis;
- Dilute (10%) nitric acid rinse if samples are collected for metals analysis; and
- Distilled/deionized rinse, air dry.

5.1.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use, between boreholes and prior to demobilization using high-pressure steam. Decontamination will be conducted at a dedicated decontamination pad constructed for the project or at an alternate location as indicated in the site-specific Work Plan or site-specific FAP. Decontamination fluids will be containerized (drummed) for subsequent characterization or disposal, unless other arrangements are made on a project-specific basis and as indicated in the site-specific Work Plan.

5.1.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the site-specific Work Plan, site-specific FAP, or HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

5.2 Management of Investigation Derived Waste

Investigation-derived waste (IDW) management will be in accordance with section 3.3(3e) of DER-10 (NYSDEC, 2010). The sampling methods and equipment will be selected to limit both the need for decontamination and the volume of IDW.

IDW generated during field activities include, but is not limited to, the following:

- Purge water;
- Poly sheeting;
- Spent macrocore liners;
- PPE; and
- Drill cutting and soil boring spoils.

This IDW must be placed in 1A2 open head 55-gallon steel drums pending shipment off site for disposal.

Procedure:

Segregation

Drummed IDW is to be divided into the following categories:

- Drill cuttings and soil boring spoils (see Section 3.0);
- Purgewater from monitoring well development/sampling; and,
- Solid waste other than drill cuttings and boring spoils (i.e., spent poly tubing, PPE, etc.).

Generator ID

Any IDW generated is assigned USEPA Generator ID Number TBD.

Hazardous/Non-Hazardous Classification

AECOM will collect characterization samples to classify the IDW as either hazardous or non-hazardous.

Shipment/Disposal

Drummed IDW must be staged at its point of origin until it is shipped off site on the same day it's generated or staged in a designated and secured area until it can be shipped off site at a later date.

All IDW must be shipped off site by a permitted contractor to a permitted facility and may be disposed of at a facility licensed to accept hazardous waste, if necessary.

Manifests

Waste manifests must accompany the IDW during shipment off site for disposal. For non-hazardous waste, a non-hazardous waste manifest must be completed. For hazardous waste, a Uniform Hazardous Waste Manifest (USEPA Form 8700-22) must be completed, along with a Land Disposal Restriction Notification Form 1. IDW manifests can be signed by AECOM personnel as agents for the generator (NYSDEC).

6.0 Community Air Monitoring Program

A Community Air Monitoring Plan (CAMP) is used to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities.

The protocols cited below are based on the NYSDOH Generic CAMP (May, 2010; Appendix 1A to DER-10 [NYSDEC, 2010]) which is typically utilized by NYSDEC as guidance for work conducted under these contracts.

6.1 Monitoring

Real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter and surrounding community of the work area may be necessary. Monitoring activities will consist of a combination of continuous and periodic monitoring, which will be performed dependent upon the type of activity being conducted at the site, as discussed below.

The specific types of monitoring necessary and appropriate for any particular project will be determined by NYSDEC and AECOM and specified in the site-specific Work Plan and site-specific FAP.

6.1.1 Continuous Air Monitoring

Continuous monitoring for VOCs and particulates may be required for ground intrusive activities associated with the site, including, but not limited to, the installation of soil borings and groundwater monitoring wells and test pit excavation.

VOC monitoring will be conducted at the downwind perimeter of the immediate work area on a continuous basis. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. VOC monitoring will be performed using a MiniRAE 2000 or equivalent, which is appropriate to detect a wide range of contaminants typically encountered. The MiniRAE 2000 will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The MiniRAE 2000 is capable of calculating 15-minute running average concentrations, which will be compared to the action levels specified below.

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) such as a Thermo MIE pDR-4000 DataRam or equivalent. The Thermo MIE pDR-4000 DataRam is a real-time monitoring equipment capable of measuring

particulate matter less than 10 microns (µm) in size [PM-10] and capable of integrating over a period of 15 minutes for comparison to the airborne particulate action level. The Thermo MIE pDR is equipped with an audible alarm to indicate exceedance of the action level. In addition to using the Thermo MIE pDR-4000 DataRam, fugitive dust migration will be visually assessed during work activities. If particulate concentrations at the upwind station are higher or equivalent to concentrations at or downwind of work areas, then continuous air monitoring may be discontinued, as approved by NYSDEC.

6.1.2 Periodic (As-Needed) Air Monitoring

Periodic or as-needed air monitoring for VOCs may be required during non-intrusive activities associated with the site-specific Work Plan. Non-intrusive activities may include the collection of soil and sediment samples, the collection of groundwater samples from existing monitoring wells, and the collection of indoor air and soil vapor samples. Periodic air monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

6.2 Action Levels and Response

This subsection identifies the action levels and corresponding responses for concentrations of VOCs and particulates detected during the field activities associated with a site.

6.2.1 Volatile Organic Compounds

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted, and monitoring will continue. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be stopped, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 ft downwind of the work zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 ft), is below 5 ppm over background for the 15-minute average.

If the organic vapor level is above 25 ppm at the perimeter of the work area, field activities will be shut down.

All 15-minute readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings (if any) used for decision purposes will also be recorded.

6.2.2 Particulates

If the downwind PM-10 particulate level is 100 µg/m^3 greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, the downwind PM-10 particulate levels are greater than 150 µg/m^3 above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

Similar to the VOC readings, particulate readings will be recorded and be available for state (NYSDEC and NYSDOH) and county health personnel to review.

7.0 Field Records and Documentation

The objective of this subsection is to provide consistent procedures and formats by which field records will be kept and activities documented, and a methodology by which field records will be managed. Field records and documentation to be used during field activities include Field Log Books and Standard Forms. Standard Forms are provided in Appendix B.

7.1 Field Log Books

Field log books will be prepared and maintained throughout the course of the investigation**. With the exception of PFAS sampling events (Appendix A)**, only bound, weatherproof field log books will be used by personnel working on NYSDEC projects. The log books will be turned in for copying/filing/tracking when complete. **If performing PFAS sampling, then loose leaf notebook paper shall be used in lieu of a field log book**.

Each log book will be labeled on the front cover in indelible ink with the following designation: “Site Name/Project Type, NYSDEC Work Assignment D009803-xx, AECOM Project Number ######.”

Log book entries will be recorded in indelible, waterproof ink. If errors are made in any field log book, field record (form), Chain-of-Custody Record, or any other field record document, corrections will be made by crossing a single line through the error, entering the correct information, and initialing and dating the correction.

Standard Forms have been adopted in this FAP to facilitate the collection of consistent data (see Appendix B). This will preclude detailed documentation of, for example, lithologic descriptions in the field log book. A reference, however, to use of each specific form must be made in the log book.

The date will be placed at the top of every page in the left-hand corner of the right page. The time of entry recordings will be in columnar form down the left-hand side of the right page. If an entry is made in a non-dedicated log book, then the date, project name, and project number will be entered left to right, respectively, along the top of the right page. Entries should be dated, and time of entry recorded. At the beginning of each day, the first two entries will be “Personnel/Contractors On Site” and “Weather.” At the end of each day's entry or particular event, if appropriate, the person entering the field notes should draw a diagonal line originating from the bottom left corner of the page to the conclusion of the entry and sign along the line indicating the conclusion of the entry or the day's activity.

Entries in field log books will be legible (printing is preferable) and will contain accurate and inclusive documentation of project activities (investigation, monitoring remediation, closure, maintenance, etc.). Information pertaining to health and safety aspects, personnel on site,

visitor's names, association, and time of arrival/departure, etc., should also be recorded. Language should be objective, factual, and free of personal feelings or other terminology that might prove inappropriate, since field records are the basis for later written reports. Once completed, these field log books become accountable documents and must be maintained as part of the project files.

Sample collection and handling activities, as well as visual observations, will be documented in the field log books. The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the field log books. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded in the field log books, except where these are referenced as being recorded on approved field forms. Field analyses and measurements must be traceable to the specific piece of field equipment utilized and to the field investigator collecting the sample, making the measurement, or conducting analyses. Log books will be updated as field work progresses.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the pages of the field log book that were filled out during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

When an individual log book is full, the log book will be submitted to the AECOM project manager for final cataloging and filing. The log books will be stored in the Project File. Copies of specific sections will be made available to personnel upon request.

7.2 Standard Forms

All non-bound field records (e.g., drilling logs, well construction forms, sampling logs, etc.) will be completed the day the associated activity occurs. Field data collected using electronic data loggers or computer entry forms, will be downloaded as soon as practical onto CDs and/or uploaded to office servers. If possible, the person collecting the data will download electronic data on a daily basis. This person will be responsible for verifying that the data collected are adequately represented in electronic media and in the file. Examples of forms typically used are provided in Appendix B of this FAP.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the field forms that were completed during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

7.3 Sample Identification

During this project, a unique sample identifier will designate each sample collected. The following system may be used to assign unique sample identification numbers; however, modifications should be made as needed to clearly and appropriate identify samples for each site or project. Each sample will be identified by an alphanumeric character identifier, as described below.

The following codes will be used for identifying other sample types:

CODE	Sample Type
MW	Monitoring well
SB	Soil boring
SW	Surface water
SD	Sediment
IA	Indoor air
OA (or AA)	Outdoor (or ambient) air
SV	Soil vapor
FB	Field (Rinsate) Blank
N + 50	Field Duplicate (e.g., field duplicate of MW-3S will be MW-53S)
TB	Trip Blank
MS/MSD	Matrix Spike/ Matrix Spike Duplicate

Field blanks and tip blanks will be labeled for the day of collection. For MS/MSD samples, the MS/MSD will be added to the sample ID and included on the COC as a note.

An example of the sample numbering system is provided below.

Sample Identifier	Description
MW-1S	Shallow well MW-1S
MW-101D	Deep monitoring well MW-101D
SB-02-0406	Soil sample from 4 to 6 ft interval from boring SB-02.
SS-01	Surface soil sample from location SS-01.
FBW110502	Field blank associated with water samples collected on 5/2/11
TB110503	Trip blank associated with samples shipped 5/3/11.

7.4 Sample Labeling

A non-removable label will be affixed to each sample container. Labels will be marked with permanent marker pens. The following information will be contained on each label:

Project name;

Sample identifier;

Company (AECOM);

Sample date and time;

Sampler's initials;

Sample preservation; and

Analysis required.

7.5 Sample Shipping

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures should follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1. The chain-of-custody (COC) record (Appendix B) should be completely filled out, with all relevant information.

2. The original COC goes with the samples. It should be placed in a Ziploc bag and taped inside the sample cooler. The sampler should retain a copy of the COC.

3. Place inert cushioning material such as vermiculite or bubble-wrap in the bottom of the cooler.

4. Place the bottles in the cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).

5. Wrap VOA vials securely in bubble-wrap and tape. Place them in the center of the cooler.

6. With the exception of Summa® canisters, pack the cooler with ice in doubled Ziploc plastic bags.

7. Pack the cooler with cushioning material.

8. Tape the drain shut.

9. Wrap the cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.

10. Place the lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.

11. Summa® canisters are shipped in the same boxes the laboratory used for shipping.

12. Ship samples via overnight carrier the same day that they are collected. Samples (except Summa® canisters) must be maintained at 4 degrees Celsius (C) ± 2ºC throughout the shipping duration.

8.0 References

American Society for Testing and Materials (ASTM) D1452/D1452M-16, *Standard Practice for Soil Exploration and Sampling by Auger Borings*

ASTM D1586/ D1586M-18. *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*.

ASTM D1587/D1587M-15. *Standard Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes*.

ASTM D2113-14. *Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration*.

ASTM D2487-17. *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*.

ASTM D2488-17. *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*.

ASTM D4750-87(2001). *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*.

ASTM D5092/D5092M-16. *Standard Practice for Design and Installation of Groundwater Monitoring Wells*.

ASTM D5299/D5299M-18. *Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities*.

ASTM D5782-95. *Standard Guide for Use of Direct Air-Rotary Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices*.

ASTM D5783-18. *Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices*.

ASTM D6001-05(2012). *Standard Guide for Direct-Push Groundwater Sampling for Environmental Site Characterization*.

ASTM D6282/D6282M-14. *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations*.

ASTM D6907-05(2016). *Standard Practice for Sampling Soils and Contaminated Media with Hand-Operated Bucket Augers*.

ASTM D6914/D6914M-16. *Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices*.

New York State Department of Environmental Conservation (NYSDEC), 2008. NYSDEC Modifications to EPA Region 9 TO-15 QA/QC Criteria. February 2008.

NYSDEC, 2009. CP-43 Groundwater Monitoring Well Decommissioning Policy. November 3, 2009.

NYSDEC, 2010. DER-10 Technical Guidance for Site Investigation and Remediation. May 3, 2010.

United States Environmental Protection Agency (USEPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. USEPA Office of Emergency and Remedial Response. EPA/540/G-89/004. October.

USEPA, 1998. Region II Sampling SOP - Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling. March 16, 1998.

USEPA, 2002. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. OSWER. Douglas Yeskis and Bernard Zavala. EPA 542-S-02-001. May 2002.

Appendix A

NYSDEC PFAS Sampling and Analysis Guidance

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

GUIDELINES FOR SAMPLING AND ANALYSIS OF PFAS

Under NYSDEC's Part 375 Remedial Programs

January 2020

www.dec.ny.gov

Contents

ERRATA SHEET for

Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Program
Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date

January 2020

Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis and reporting of PFAS, DER has developed this document to summarize procedures and update previous DER technical guidance pertaining to PFAS.

Applicability

Sampling for PFAS has already been initiated at numerous sites under DER-approved work plans, in accordance with specified procedures. All future work plans should include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day or one per twenty samples, whichever is more frequent.

Data Assessment and Application to Site Cleanup

Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10.

Water Sample Results

PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt). In addition, further assessment of water may be warranted if either of the following screening levels are met:

a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or
b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L

If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase.

Sites in the site management phase should evaluate for PFAS to determine if modification to any components of the SMP is necessary (e.g., monitoring for PFAS, upgrading treatment facilities, or performing an RSO).

Testing for Imported Soil

Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the *PFAS Analyte List* (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.

If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Analysis and Reporting

As of January 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix F) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1 or ISO 25101. Laboratories should adhere to the guidelines and criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist.

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay). Commercially methods are also available for biota and air samples.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.

Please note that TOP Assay analysis of highly-contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP-approved lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1, EPA Method 533, or ISO 25101
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification. Previous results of "non-detect" for PFAS from the UCMR3 water supply testing program are acceptable as verification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., wash room sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank every day that sampling is conducted and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the latest guidelines developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8).

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate "Age" column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish's tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with "fluor" in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Maikels, at dana.maikels@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Maikels, at dana.maikels@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of five standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%. Linear fit calibration curves should have an R^2 value greater than 0.990.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

Appendix B

Field Sampling Forms

CHAIN OF CUSTODY RECORD

AECOM

PROJECT NO. | SITE NAME

SAMPLERS (PRINT/SIGNATURE)

LAB _____

COOLER _____ of _____

PAGE _____ of _____

DELIVERY SERVICE: _____ AIRBILL NO.: _____

TESTS

BOTTLE TYPE AND PRESERVATIVE

LOCATION IDENTIFIER	DATE	TIME	COMP/ GRAB	SAMPLE ID	MATRIX	TOTAL NO. # OF CONTAINERS	REMARKS	SAMPLE TYPE	BEGINNING DEPTH (IN FEET)	ENDING DEPTH (IN FEET)	FIELD LOT NO.# (IRPIMS ONLY)

MATRIX CODES

AA - AMBIENT AIR; SE - SEDIMENT; SH - HAZARDOUS SOLID WASTE; SL - SLUDGE; WP - DRINKING WATER; WW - WASTE WATER; WG - GROUND WATER; SO - SOIL; DC - DRILL CUTTINGS; WL - LEACHATE; GS - SOIL GAS; WC - DRILLING WATER; WO - OCEAN WATER; WS - SURFACE WATER; WQ - WATER FIELD QC; LH - HAZARDOUS LIQUID WASTE; LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK; SD# - MATRIX SPIKE DUPLICATE; RB# - RINSE BLANK; FR# - FIELD REPLICATE; N# - NORMAL ENVIRONMENTAL SAMPLE; MS# - MATRIX SPIKE

(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME

SPECIAL INSTRUCTIONS

Distribution: Original accompanies shipment, copy to coordinator field files

AIR SAMPLE
CHAIN OF CUSTODY RECORD

AECOM CONTACT: _____

PROJECT NUMBER	SITE NAME
SAMPLERS (PRINT/SIGNATURE)	

DELIVERY SERVICE: _____ AIRBILL NO.: _____

LAB _____

SHIPPING CONTAINER _____ of _____

PAGE _____ of _____

LOCATION IDENTIFIER	SAMPLE DATE	SAMPLE TIME	SAMPLE ID	MATRIX CODE	CANISTER SIZE (LITERS)	CANISTER ID	FLOW CONTROLLER ID	INITIAL PRESSURE/ VACUUM (" Hg)	FINAL PRESSURE/ VACUUM (" Hg)	PRESSURE/VACUUM UPON LAB RECEIPT (" Hg)	REQUIRED ANALYSIS			REMARKS	SAMPLE TYPE CODE

MATRIX CODES	AA - AMBIENT AIR	AI - INDOOR AIR	AQ - FIELD QC	AS - SUB-SLAB AIR	GS - SOIL GAS
SAMPLE TYPE CODES	N# - NORMAL ENVIRONMENTAL SAMPLE	FD# - FIELD DUPLICATE	MS# - MATRIX SPIKE	(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)	

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	SPECIAL INSTRUCTIONS
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME	

Distribution: Original accompanies shipment, copy to project file

DAILY DRILLING RECORD

AECOM

PROJECT TITLE: _____ DATE: _____

CLIENT: _____ CONTRACTOR: _____

FROM	TO	PRODUCTIVE HOURS	ACTIVITIES/COMMENTS
TOTAL PRODUCTIVE HOURS			LEVEL B / LEVEL C / LEVEL D (CIRCLE ONE SELCTION)

LABOR:		MATERIALS / SUPPLIES:	
UNITS		UNITS	

WEATHER:

_____ AECOM ONSITE COORDINATOR	_____ CONTRACTOR REPRESENTATIVE

TEST PIT LOG

PROJECT:			Sheet 1 of 1
CLIENT:	NYSDEC	**JOB NUMBER:**	
CONTRACTOR:		**LOCATION:**	Brooklyn, New York
DATE STARTED:		**GROUND ELEVATION:**	
DATE COMPLETED:		**OPERATOR:**	
TRENCH NUMBER:		**GEOLOGIST:**	

DEPTH (FT)	DESCRIPTION
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

COMMENTS:

AECOM

TEST BORING LOG

BORING NO:

PROJECT: | SHEET: 1 of

CLIENT: | JOB NO.:

BORING CONTRACTOR: | BORING LOCATION:

GROUNDWATER: | GROUND ELEVATION:

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE				
				DIA.				
				WT.				
				FALL				

DATE STARTED:

DATE FINISHED:

DRILLER:

GEOLOGIST:

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FEET	SAMPLE TIME	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		ROD%	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	REMARKS
5										
10										
15										
20										
25										
30										

COMMENTS:

PROJECT NO.

BORING NO.

AECOM

TEST BORING LOG

PROJECT:									BORING NO:
CLIENT:									SHEET: of
BORING CONTRACTOR:									JOB NO.:
GROUNDWATER:					CAS.	SAMPLER	CORE	TUBE	BORING LOCATION:
DATE	TIME	LEVEL	TYPE	TYPE					GROUND ELEVATION:
				DIA.					DATE STARTED:
				WT.					DATE FINISHED:
				FALL					DRILLER:
				* POCKET PENETROMETER READING					GEOLOGIST:
									REVIEWED BY:

	SAMPLE					DESCRIPTION			
DEPTH FEET	TIME	NO.	TYPE	BLOWS PER 6"	ROD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	REMARKS

COMMENTS:

PROJECT NO.

BORING NO.

DRILLING SUMMARY

Geologist:

Drilling Company:

Driller:

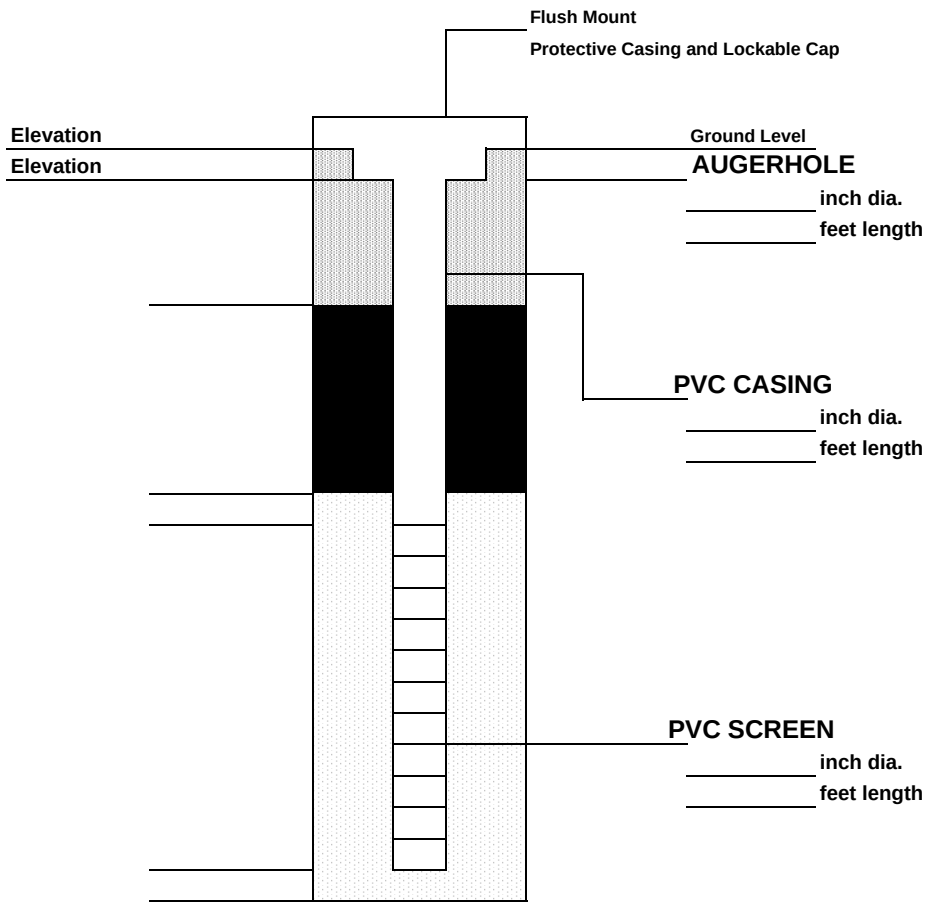
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 4" PVC	**Type:** #2 Sand **Setting:**
Monitor: 4" PVC	**Slot Size:** .020"	***SEAL MATERIAL***
		Type: Bentonite **Setting:**

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client:	**Location:**	**Project No.:**
AECOM	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:**

Flush Mount

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

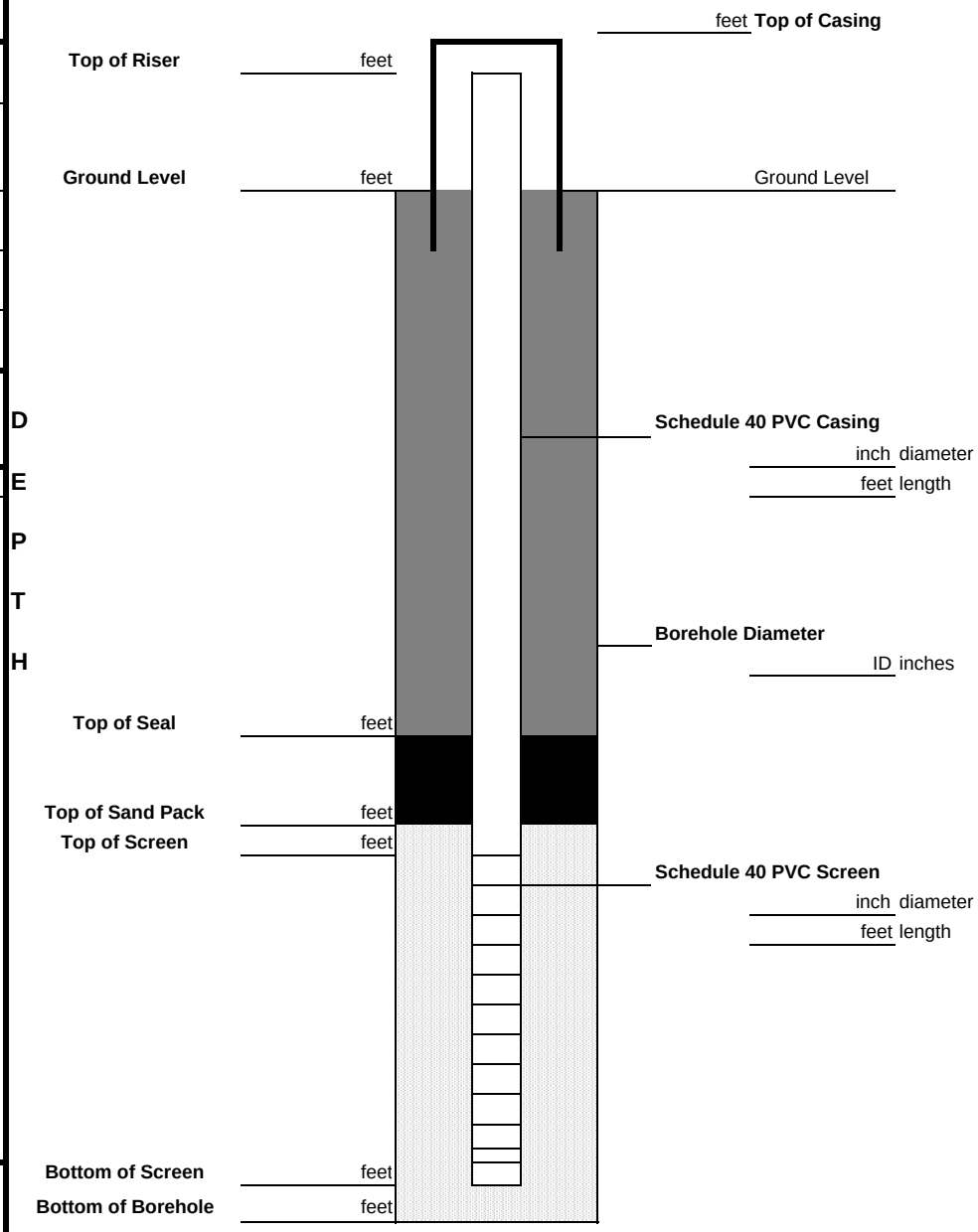
Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL

Surface: 12" Steel protective cover (Stick Up)

Monitor: 4" Schedule 40 PVC

SCREEN MATERIAL

Type: 4" Schedule 40 PVC

Slot Size: 0.020"

FILTER MATERIAL

Type: #2 well sand

Setting:

SEAL MATERIAL

Type 1: Bentonite chips

Setting:

Type 1:

Setting:

COMMENTS:

LEGEND

Cement Grout

Bentonite Seal

Sand Pack

Client: NYC

Location:

Project No.:

AECOM

MONITORING WELL CONSTRUCTION DETAILS

Well Number:

Stick-Up

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

Model:

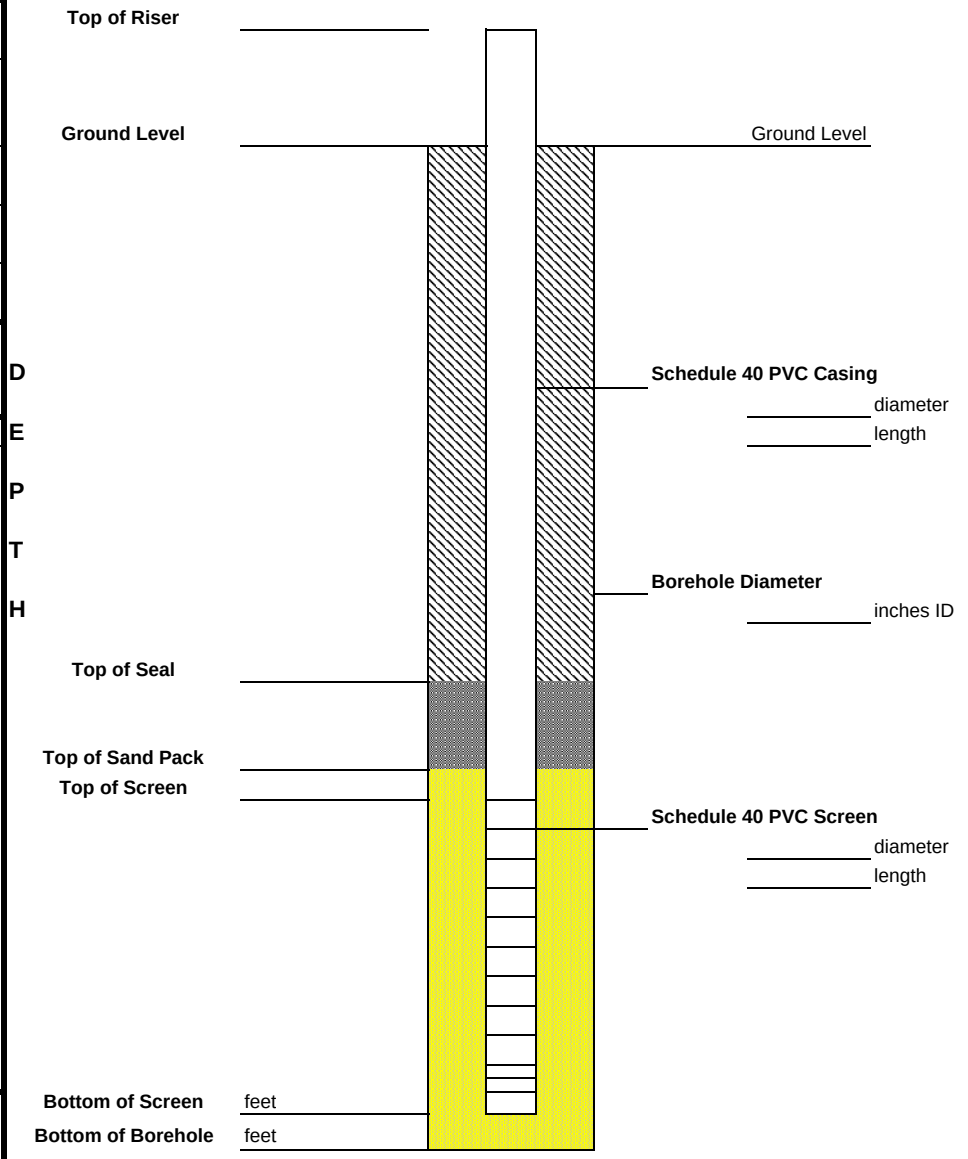
Date:

GEOLOGIC LOG

Depth(ft.)	Description

DEPTH

WELL DESIGN



CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface:	**Type:** 1" Schedule 40 PVC	**Type:** **Setting:**
Monitor:	**Slot Size:**	**SEAL MATERIAL** **Type 1:** **Setting:** **Type 2:** **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client:	Location:	Project No.:
AECOM	PIEZOMETER CONSTRUCTION DETAILS	Well Number:

::

DRILLING SUMMARY

Geologist:

Drilling Company:

Driller:

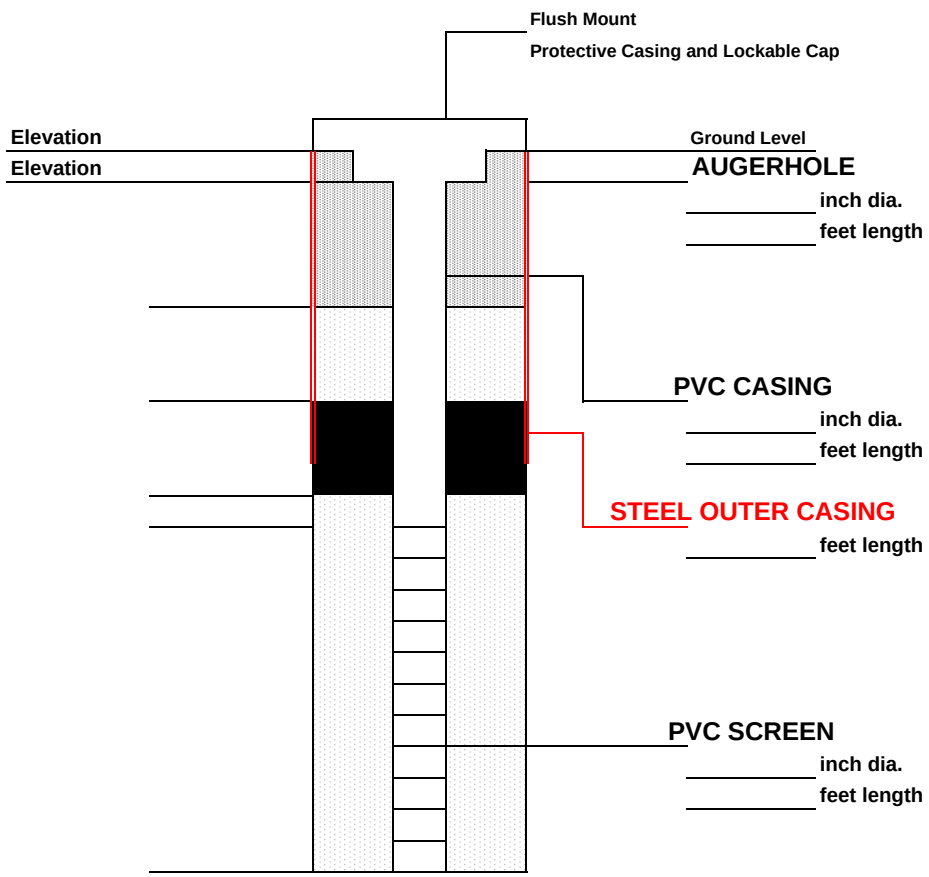
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description
	See boring log for lithologic description.

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface:	**Type:**	**Type:** **Setting:**
Monitor:	**Slot Size:**	***SEAL MATERIAL*** **Type:** Bentonite **Setting:**

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	**Location:**	**Project No.:**
AECOM	**BEDROCK MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:** MW-08

DRILLING SUMMARY

Geologist:

Drilling Company:

Driller:

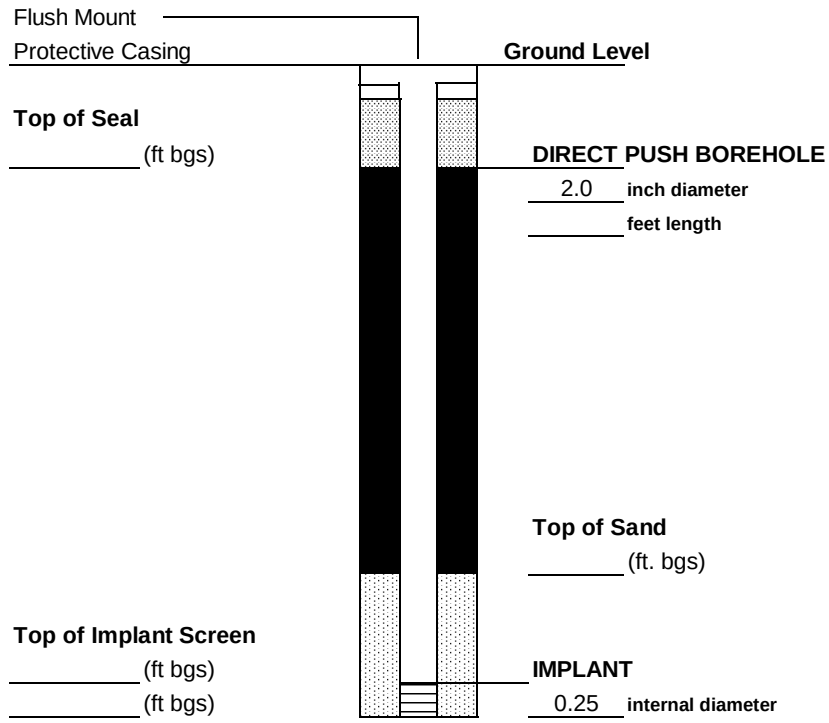
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

D E P T H (FT)



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 6 inch stainless steel implant	**Type:** #2 Sand
		SEAL MATERIAL
Monitor: 3/8 inch OD polyethylene tubing	**Pore Diameter:** 0.007 inch	**Type:** Bentonite Slurry

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	Location:	**Project No.:**
AECOM	**SOIL VAPOR IMPLANT CONSTRUCTION DETAILS**	**Well Number:**

WELL DEVELOPMENT LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.0	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.02	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.0	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x ___)	=	0	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		0.75"	0.02

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											

COMMENTS:

WELL PURGING LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.00	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.00	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 3)	=	0.00	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS											
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											

COMMENTS:

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

Project: _____ Site: _____ Well I.D.: _____

Date: _____ Sampling Personnel: _____ Company: AECOM

Purging/ Sampling Device: _____ Tubing Type: _____ Pump/Tubing Inlet Location: Screen midpoint

Measuring Point: Below Top of Riser Initial Depth to Water: _____ Depth to Well Bottom: _____ Well Diameter: _____ Screen Length: _____

Casing Type: PVC Volume in 1 Well Casing (liters): _____ Estimated Purge Volume (liters): _____

Sample ID: _____ Sample Time: _____ QA/QC: _____

Sample Parameters: _____

PURGE PARAMETERS

TIME	pH	TEMP (^{0}C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	**0.1**	**---**	**3%**	**10%**	**10%**	**+ or - 10**	**---**	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft; 1 inch diameter well = 154 ml/ft; 2 inch diameter well = 617 ml/ft; 4 inch diameter well = 2470 ml/ft ($vol_{cyl} = \pi r^2 h$)

Remarks:

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: _____ Site Code: _____ Operable Unit: _____

Building Code: _____ Building Name: _____

Address: _____ Apt/Suite No: _____

City: _____ State: _____ Zip: _____ County: _____

Contact Information

Preparer's Name: _____ Phone No: _____

Preparer's Affiliation: _____ Company Code: _____

Purpose of Investigation: _____ Date of Inspection: _____

Contact Name: _____ Affiliation: _____

Phone No: _____ Alt. Phone No: _____ Email: _____

Number of Occupants (total): _____ Number of Children: _____

☐ Occupant Interviewed? ☐ Owner Occupied? ☐ Owner Interviewed?

Owner Name (if different): _____ Owner Phone: _____

Owner Mailing Address: _____

Building Details

Bldg Type (Res/Com/Ind/Mixed): _____ Bldg Size (S/M/L): _____

If Commercial or Industrial Facility, Select Operations:

If Residential Select Structure Type:

Number of Floors: _____ Approx. Year Construction: _____ ☐ Building Insulated? ☐ Attached Garage?

Describe Overall Building 'Tightness' and Airflows(e.g., results of smoke tests):

Foundation Description

Foundation Type: _____ Foundation Depth (bgs): _____ Unit: FEET

Foundation Floor Material: _____

Foundation Wall Material: _____

Foundation Floor Thickness: _____

Foundation Wall Thickness: _____ Unit: INCHES

☐ Floor penetrations? Describe Floor Penetrations: _____

☐ Wall penetrations? Describe Wall Penetrations: _____

Basement is: _____ Basement is: _____ ☐ Sumps/Drains? Water In Sump?: _____

Describe Foundation Condition (cracks, seepage, etc.) : _____

☐ Radon Mitigation System Installed? ☐ VOC Mitigation System Installed? ☐ Mitigation System On?

Heating / Cooling / Ventilation Systems

Heating System: _____ Heat Fuel Type: _____ ☐ Central A/C Present?

Vented Appliances

Water Heater Fuel Type: _____ Clothes Dryer Fuel Type: _____

Water Htr Vent Location: _____ Dryer Vent Location: _____

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

PRODUCT INVENTORY

Building Name: _____ Bldg Code: _____ Date: _____

Bldg Address: _____ Apt/Suite No: _____

Bldg City/State/Zip: _____

Make and Model of PID: _____ Date of Calibration: _____

Location	Product Name/Description	Size (oz)	Condition *	Chemical Ingredients	PID Reading	COC Y/N?
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐

* Describe the condition of the product containers as **Unopened (UO)**, **Used (U)**, or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Complete? ☐ Were there any elevated PID readings taken on site? ☐ ☐ Products with COC?

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Site Name: _____ Site Code: _____ Operable Unit: _____

Building Code: _____ Building Name: _____

Address: _____ Apt/Suite No: _____

City: _____ State: _____ Zip: _____ County: _____

Factors Affecting Indoor Air Quailty

Frequency Basement/Lowest Level is Occupied?: _____ Floor Material: _____

☐ Inhabited? ☐ HVAC System On? ☐ Bathroom Exhaust Fan? ☐ Kitchen Exhaust Fan?

Alternate Heat Source: _____ ☐ Is there smoking in the building?

☐ Air Fresheners? Description/Location of Air Freshener: _____

☐ Cleaning Products Used Recently?: Description of Cleaning Products: _____

☐ Cosmetic Products Used Recently?: Description of Cosmetic Products: _____

☐ New Carpet or Furniture? Location of New Carpet/Furniture: _____

☐ Recent Dry Cleaning? Location of Recently Dry Cleaned Fabrics: _____

☐ Recent Painting/Staining? Location of New Painting: _____

☐ Solvent or Chemical Odors? Describe Odors (if any): _____

☐ Do Any Occupants Use Solvents At Work? If So, List Solvents Used: _____

☐ Recent Pesticide/Rodenticide? Description of Last Use: _____

Describe Any Household Activities (chemical use,/storage, unvented appliances, hobbies, etc.) That May Affect Indoor Air Quality:

☐ Any Prior Testing For Radon? If So, When?: _____

☐ Any Prior Testing For VOCs? If So, When?: _____

Sampling Conditions

Weather Conditions: _____ Outdoor Temperature: _____ °F

Current Building Use: _____ Barometric Pressure: _____ in(hg)

Product Inventory Complete? _____ ☐ Building Questionnaire Completed?

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

Building Code: _____ Address: _____

Sampling Information

Sampler Name(s): _____ Sampler Company Code: _____

Sample Collection Date: _____ Date Samples Sent To Lab: _____

Sample Chain of Custody Number: _____ Outdoor Air Sample Location ID: _____

SUMMA Canister Information

Sample ID:					
Location Code:					
Location Type:					
Canister ID:					
Regulator ID:					
Matrix:					
Sampling Method:					

Sampling Area Info

Slab Thickness (inches):					
Sub-Slab Material:					
Sub-Slab Moisture:					
Seal Type:					
Seal Adequate?:	☐	☐	☐	☐	☐

Sample Times and Vacuum Readings

Sample Start Date/Time:					
Vacuum Gauge Start:					
Sample End Date/Time:					
Vacuum Gauge End:					
Sample Duration (hrs):					
Vacuum Gauge Unit:					

Sample QA/QC Readings

Vapor Port Purge:	☐	☐	☐	☐	☐
Purge PID Reading:					
Purge PID Unit:					
Tracer Test Pass:	☐	☐	☐	☐	☐

Sample start and end times should be entered using the following format: MM/DD/YYYY HH:MM

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

LOWEST BUILDING LEVEL LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the lowest building level .
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sket
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or **F**	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	**xxxxxxx**	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	**######**	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

FIRST FLOOR BUILDING LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the first floor of the building.
The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sket
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or **F**	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	**xxxxxxx**	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	**######**	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Structure Sampling Questionnaire and Building Inventory

New York State Department of Environmental Conservation

OUTDOOR PLOT LAYOUT SKETCH

Please click the box with the blue border below to upload a sketch of the outdoor plot of the building as well as the surrounding area. The sketch should be in a standard image format (.jpg, .png, .tiff)

Clear Image

Design Sketch

Design Sketch Guidelines and Recommended Symbology

- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sket
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or **F**	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	**xxxxxxx**	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	**######**	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Summa Canister Data Sheet

Site:

Samplers:

Date:

Sample #					
Location					
Summa Canister ID					
Flow Controller ID					
Additional Tubing Added	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much
Purge Time (Start)					
Purge Time (Stop)					
Total Purge Time (min)					
Purge Volume					
Initial Tracer Gas Results					
CH4 (ppm)					
O2 (%)					
H2S (ppm)					
CO2 (ppm)					
Pressure Gauge - before sampling					
Sample Time (Start)					
Sample Time (Stop)					
Total Sample Time (min)					
Pressure Gauge - after sampling					
Sample Volume					
Canister Pressure Went To Ambient Pressure?	YES / NO	YES / NO	YES / NO	YES / NO	YES / NO
Final Tracer Gas Results					
Weather 24 hours before and during sampling					

General Comments:

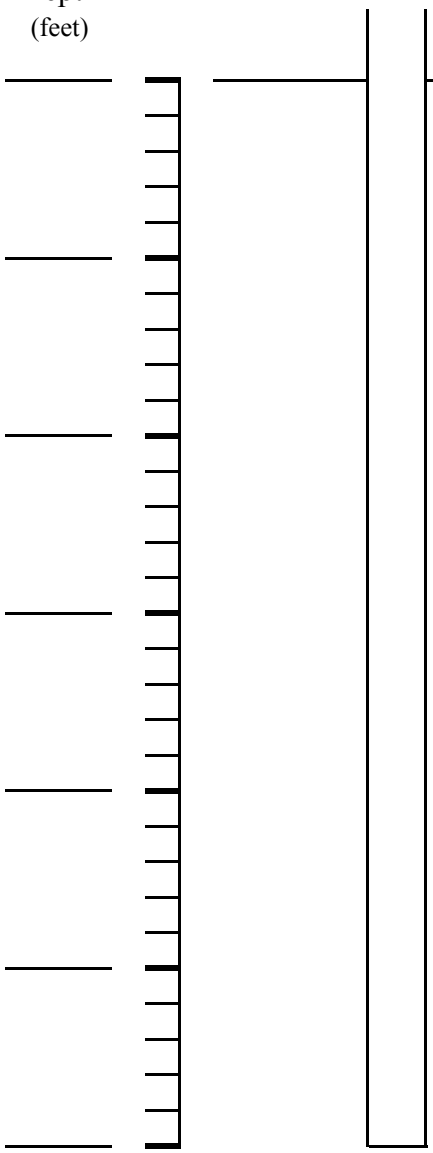
WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING	
Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	
CASING PULLING	
Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	
CASING PERFORATING	
Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	
GROUTING	
Interval grouted (FBLS)	
# of batches prepared	
For each batch record:	
Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*



COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

AECOM

DATE:

DAY	S	M	T	W	TH	F	S

DAILY CONSTRUCTION REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP	To 32	32-50	50-70	70-85	85 and up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT:

CONTRACTOR:

AECOM JOB No.:

AECOM PROJECT MANAGER:

AVERAGE FIELD FORCE

Name of Contractor	Non-manual	Manual	Remarks

VISITORS

Time	Representing	Representing	Remarks

EQUIPMENT AT THE SITE:

CONSTRUCTION ACTIVITIES:

See attached photos

Sheet: 1 of

☐ X - designates info on backside of page

By: _____ Title: _____

Reviewed by: _____ Title: _____

DAILY CONSTRUCTION REPORT (cont'd)

REPORT No.:________________________________

PROJECT:
CONTRACTOR:
AECOM JOB No.: **DATE:**

CONSTRUCTION ACTIVITIES (cont'd):

Sheet: of

By: Title:
Reviewed by: Title:

APPENDIX I - RESPONSIBILITIES of OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the Lackawanna Incinerator Site (the "site"), number 915206, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as: the City of Lackawanna (the "owner").

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:
The City of Lackawanna, 714 Ridge Road, Lackawanna, NY 14218.

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in an Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow

the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3-Notifications.

6) If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) The owner will maintain fences and conduct mowing on behalf of the RP. The RP remains ultimately responsible for maintaining the engineering controls.

9) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3- Notifications of the SMP.

7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX J - PERMITS AND/OR PERMIT EQUIVALENT

No permits are anticipated for annual inspection, monitoring or maintenance. Permits may be required if the property is to be developed at a later date.

APPENDIX K -REQUEST TO IMPORT/REUSE FILL MATERIAL FORM

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 10 sieve? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised August 2014