FINAL REMEDIAL INVESTIGATION PHASE 1 FIELD REPORT – AOC 4 AND AOC 5

FORMER NEW YORK ORDNANCE WORKS
FORMERLY USED DEFENSE SITE
BALDWINSVILLE, NEW YORK

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ACRONYMS AND ABBREVIATIONS

2,4-DNP	2,4-dinitrophenol
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AOC	area of concern
APP	Accident Prevention Plan
ASTM	American Society for Testing Materials
B/N	base/neutral extractable
bgs	below ground surface
Bluestone	Bluestone Environmental Group, Inc.
BNASIM	base neutral acid-selective ion monitoring
btoc	below top of casing
CEC	cation exchange capacity
CENAE	New England District (USACE)
CoC	chain of custody
CSM	conceptual site model
DBH	diameter at breast height
DD	Decision Document
DL	detection limit
DNCB	dinitrochlorobenzene
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct push technology
DQCR	Daily Quality Control Report
DQI	data quality indicator
DQO	data quality objective
DU	decision unit
EM-31	Geonics EM-31 MKII Terrain Conductivity Meter
EM-61	Geonics EM-61 MKII Metal Detector
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
FD	field duplicate
FOD	frequency of detection
FS	Feasibility Study
FTL	Field Team Lead
FUDS	Formerly Used Defense Site
FUDSChem	Formerly Used Defense Sites Chemical Database
GNSS	global navigation satellite system
GPR	ground penetrating radar
GPS	Global Positioning System
IDW	investigation-derived waste
ISM	incremental sampling methodology
J	estimated concentration
L/min	liters per minute
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
LNAPL	light non-aqueous phase liquid
LOQ	limit of quantitation

ACRONYMS AND ABBREVIATIONS, CONTINUED

MicroVision	MicroVision Laboratories, Inc.
mg/kg	milligram per kilogram
mL	milliliter
MPC	measurement performance criteria
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NCBI	National Center for Biotechnology Information
NDI	Nothnagle Drilling Inc.
NYOW	New York Ordnance Works
NYSDEC	New York State Department of Environmental Conservation
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon
PAL	project action limit
PCB	polychlorinated biphenyls
PH	subsurface sample
PID	photoionization detector
PP	Proposed Plan
PPE	personal protective equipment
PQLG	project quantitation limit goal
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QC	quality control
RCRA	Resource Conservation and Recovery Act
RETTEW	RETTEW Field Services, Inc.
RI	Remedial Investigation
RPD	relative percent difference
S1VM	Stage 1 Validation Manual
S2bVEM	Stage 2B Electronic and Manual Validation
SL	surface sample
SOP	Standard Operating Procedure
SPE	solid phase extraction
SSHO	Site Safety and Health Officer
SVOC	semi-volatile organic compound
TAL	target analyte list
TOC	total organic carbon
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plan
U.S.	United States
USACE	United States Army Corps of Engineers
USCS	United Soil Classification System
VOC	volatile organic compound
WL	groundwater sample

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1.0 INTRODUCTION

Bluestone Environmental Group, Inc. (Bluestone) was tasked by the United States Army Corps of Engineers (USACE), New England District (CENAE) under Contract Number W912WJ-19-D-0001, Task Order W912WJ19F0056 to complete Remedial Investigation (RI), Feasibility Study (FS), Proposed Plan (PP) and Decision Document (DD) activities at the Former New York Ordnance Works (NYOW), Formerly Used Defense Site (FUDS) in Baldwinsville, New York (Property No. C02NY0290).

This RI Phase 1 Field Report details the activities performed in January and February 2021 at two areas of concern (AOCs) – the former bunker area (AOC 4) and the former power plant area (AOC 5). Additional field events were performed in March, April, and May 2021, including sampling at AOC 4 using the incremental sampling methodology (ISM); these activities are listed below but will be presented in a future RI Phase 1 Field Report that is specific to these activities. The following RI Phase 1 field investigations were completed in 2021:

1) January 2021 – AOC 5;
2) February 2021 – AOC 4, discrete sampling;
3) March/April 2021 – AOCs 1 and 3;
4) May 2021 – Background and investigation-derived waste (IDW); and
5) June 2021 – AOC 4, ISM sampling.

The locations of both AOCs with respect to the entire NYOW site are provided on **Figure 1**. Field activities for AOC 4 and AOC 5 were performed under separate mobilizations in February and January 2021, respectively. All work was completed in accordance with applicable Federal, State, and local regulations, as well as industry standards and best management practices. All samples were collected and analyzed in accordance with the Final Uniform Federal Policy for Quality Assurance Project Plan (UFP-QAPP) (USACE, 2020b). Programmatic updates referenced within the Final UFP-QAPP (USACE, 2020b) are included within this RI Phase 1 Field Report.

This RI Phase 1 Field Report was prepared to summarize a variety of field tasks that were completed (and for which results have been received), as part of the RI for AOC 4 and AOC 5. These tasks were coordinated with New York State Department of Environmental Conservation (NYSDEC) stakeholders. Prior to the January and February 2021 events, a site visit occurred on 15 and 16 October 2020 with local NYSDEC personnel and is summarized in a separate technical memo (Bluestone, 2020). The tasks summarized within this RI Phase 1 Field Report for AOC 4 and AOC 5 include:

- site preparation;
- brush clearing;
- geophysical investigation and survey;
- surface and subsurface soil sampling;
- groundwater sampling;
- invasive species mitigation; and
- IDW management.

A summary of methods implemented and key findings obtained during the progression of field tasks, are provided in the following sections. Field documents, field data, and laboratory data were loaded to and managed within the Formerly Used Defense Sites Chemical (FUDSChem) database.

A separate document that further addresses data usability, the Phase 1 RI risk screenings, data gaps, and recommendations for additional RI field activities as needed (i.e., Phase 2) will be prepared and provided to stakeholders following the completion of the RI Phase 1 Field Reports, which are intended only to summarize Phase 1 field activities. An RI Report will be prepared upon the completion of all field activities.

2.0 FIELD PROGRAM SUMMARY

The Bluestone field team conducted site investigation activities at AOC 5 from 4 to 16 January 2021 and at AOC 4 from 22 January to 5 February 2021. Unless specified in **Section 5.0**, investigation activities were performed in accordance with the Final UFP-QAPP (USACE, 2020b). The site activities included:

- setup of a locked, fenced staging area at AOC 4 with a storage container, dumpster, temporary restroom facilities, decontamination pad, and IDW staging area;
- vegetation and brush clearance;
- sample location utility clearance;
- surface and subsurface soil sampling;
- temporary monitoring well installation;
- groundwater grab sampling;
- synoptic groundwater elevation measurements; and
- evaluation of existing monitoring wells at AOC 4.

An overview of the field program planning/documentation and summaries of non-intrusive, field activities (i.e., not related to groundwater or soil sampling) are provided in the following subsections.

2.1 PLANNING AND DOCUMENTATION

This section outlines the documentation used both during project planning and the field activities performed for AOC 4 and AOC 5. Pertinent programmatic documents for the field activities summarized within this report include the following:

- USACE. 2020a. *Accident Prevention Plan, Former New York Ordnance Works, Baldwinsville, New York, FUDS Property Number C02NY0290, Contract Number: W912WJ-19-D-0001, Delivery Order Number: W912WJ19F0056*. Prepared for USACE CENAE. Final. May 2020.
- USACE. 2020b. *Uniform Federal Policy – Quality Assurance Project Plan, Former New York Ordnance Works, Baldwinsville, New York, FUDS Property Number C02NY0290, Contract No: W912WJ-19-D-0001, Task Order: W912WJ19F0056*. Prepared for USACE CENAE. Final. December 2020.

2.1.1 Health and Safety

Field work was performed in accordance with the Site Specific Accident Prevention Plan (APP) (USACE, 2020a). In general, work was conducted in modified Level D personal protective equipment (PPE), which included leather gloves and/or nitrile gloves, safety boots, high-visibility vests, hearing protection, eye protection, and hard hats during drilling and excavation activities. Work vehicles were equipped with first-aid kits, infection control kits, and fire extinguishers.

Special care was taken during the COVID-19 pandemic to practice safe working conditions to limit the spread of the virus. Specific actions and safety protocols required of field team members, subcontractors, and visitors are outlined in the Bluestone Safety Standard Operating Procedures (SOPs), and in the Activity Hazard Analysis titled *Avoiding the Spread of the COVID-19 Virus*, both of which are included in the APP (USACE, 2020a).

Bluestone personnel conducted daily tailgate health and safety meetings with all on-site personnel before work commenced. The daily safety meetings were led by the Site Safety and Health Officer (SSHO). Daily safety meeting topics encompassed implementation of the field activities for the day, potential associated hazards, and avoidance of identified hazards.

The SSHO recorded the following information on the daily safety meeting form each day:

- date and time;
- personnel on-site;
- weather forecast;
- project information (name, city/town, and type of work);
- chemicals used;
- protective clothing/equipment;
- site-specific chemicals and hazards;
- emergency response procedures; and
- nearest emergency medical facility.

In addition to the standard daily topics, the SSHO presented a daily health and safety highlight to on-site personnel. Specific topics included:

- COVID-19 protocol;
- hearing and eye protection;
- pinch points on drums and equipment;
- slips, trips, and falls;
- road safety (traffic and icy conditions);
- cold weather hydration; and
- equipment ergonomics.

All on-site personnel attended the mandatory daily briefings and are listed on the daily safety meeting form. The safety briefing was repeated on an individual basis if any personnel arrived at the site after the conclusion of the daily meeting. No near misses, recordable, or reportable incidents occurred during field activities at AOC 4 and AOC 5. Completed daily safety meeting forms are presented in **Appendix A**.

2.1.2 Daily Quality Control Reports

The Bluestone Field Team Lead (FTL) completed Daily Quality Control Reports (DQCR). The FTL role was filled by a licensed Professional Geologist and the DQCRs were reviewed and approved by the Bluestone Project Manager prior to submittal to CENAE. The DQCR is a summary of the work activities for the day, health and safety topics, samples collected, and work anticipated for the following day. The DQCR also documents personnel working and visiting the site.

Each DQCR includes:

- date;
- project location;
- weather conditions;
- daily project activities;
- on-site personnel;

- health and safety notes;
- sample collection summary;
- additional comments; and
- work anticipated for the following day.

A compilation of the DQCRs for AOC 4 and AOC 5 is provided in **Appendix B**. Deviations to the planned work activities were communicated to CENAE on the DQCRs and are presented in **Section 5.0**. The following are observations of note from the fieldwork:

- On 16 January 2021, Bluestone observed that two of the existing NYSDEC monitoring wells in AOC 4 (NYSDEC MW-1B and NYSDEC MW-2) were locked and inaccessible, and that a third existing NYSDEC monitoring well in AOC 4 (NYSDEC MW-3) was damaged. Specifically, the protective steel casing and polyvinyl chloride (PVC) riser were observed at an approximate 45 degree angle and gauging of NYSDEC MW-3 was prevented by an obstruction (most likely the bend point of the riser) at approximately three feet below top of casing (btoc). These wells were inspected to determine if they could be included in the synoptic groundwater elevation survey. Because the temporary wells provided sufficient coverage to evaluate groundwater elevations across these AOCs and data quality objectives (DQOs) were based on collecting data from only the temporary wells, the lack of gauging data from the NYSDEC wells did not affect achieving DQOs.
- On 27 January 2021, the two existing NYSDEC monitoring wells in AOC 4 (NYSDEC MW-1B and NYSDEC MW-2) that were inaccessible were cut, relocked, and gauged to record water levels. NYSDEC provided approval to cut the locks. Bluestone placed new locks on the wells and provided keys to NYSDEC.

2.1.3 Field Documentation

As referenced in *SOP No. 06 Field Documentation* of the UFP-QAPP (USACE, 2020b), all notes regarding field activities were initially documented in the NYOW field log or appropriate field form (e.g., DQCRs, well construction logs, soil boring logs, calibration forms, field sampling forms, and health and safety tailgate sheets). A compilation of the AOC 4 and AOC 5 field logs is provided in **Appendix C**.

Information recorded daily included:

- date;
- weather;
- personnel;
- site name and location of work;
- sample information (location, ID, and depth);
- well information (depth to water, total depth, and stickup height); and
- general field observations.

In addition to the NYOW field log and field forms, photographs and Global Positioning System (GPS) data were used to document field activities. A log of select photographs is provided in **Appendix D**. The collection of GPS data is further discussed in **Section 3.4** of this report.

2.2 PRELIMINARY, NON-INTRUSIVE ACTIVITIES

The following subsections summarize the preliminary, non-intrusive activities performed at both AOC 4 and AOC 5 during the January and February 2021 field events.

2.2.1 Staging Area

A fenced staging area (located about 1,000 feet north of the intersection of Potter Road and West Igloo Road) was established in the parking lot of the NYSDEC field office at AOC 4 to support field activities and stage IDW, supplies, and equipment (see **Appendix D**, Photograph 010). A decontamination pad, dumpster, storage container, and portable restroom were located within the locked fencing.

2.2.2 Vegetation Clearance

Vegetation clearing took place in select areas prior to drilling and was conducted by Nothnagle Drilling, Inc. (NDI), located in Scottsville, New York. These activities focused on clearing a pathway to access boring locations within heavily vegetated areas while minimizing the amount of vegetation removed. No trees greater than 3-inches in diameter at breast height (DBH) were cut or removed during the vegetation clearing. See **Appendix D**, Photograph 012 for an example of a cleared area.

2.2.3 Utility Clearance

Subsurface utility locating and sample location clearance took place prior to drilling at both AOCs and was conducted by Ground Penetrating Radar Systems, LLC, located in Syracuse, New York.

2.2.4 Geophysical Investigation

Bluestone's geophysical subcontractor, RETTEW Field Services, Inc. (RETTEW), located in Lancaster, PA, conducted a non-intrusive, digital geophysical mapping investigation of the possible dump area at AOC 5 to assess if there is evidence of demolition debris or disposal of other waste within AOC 5 and to delineate the boundaries of such. During the planning stage, RETTEW recommended an electromagnetic (EM) survey as an initial methodology and standard practice when investigating for subsurface disturbances related to historical dumping, followed by a ground penetrating radar (GPR) survey to scan any anomalies identified by the EM survey that are not attributed to surficial features. A summary geophysical report with a description of field activities, limitations of equipment, the results of the survey approach, corresponding figures, tables, raw data, and interpretations and conclusions is provided in **Appendix E.**

The investigation was performed using the Geonics EM-31 MKII terrain conductivity meter (EM-31). The selection of the EM-31 over another EM system such as the Geonics EM-61 MKII metal detector (EM-61) was based on the geophysical survey DQOs for AOC 5, as well as site conditions that precluded the use of EM-61. The EM-31 measures both the apparent conductivity of terrain and magnetic susceptibility and is also capable of detecting non-metallic materials, which was beneficial in detecting signature landfill responses to address the geophysical survey DQO of assessing evidence of demolition debris or disposal of other wastes in the AOC 5 possible dump area. The EM-31 is also a narrower unit than the EM-61, which was beneficial in maneuvering the unit through the dense vegetation, large diameter trees, and pockets of standing water encountered in the AOC 5 possible dump area.

The EM-31 instrument uses frequency domain technology with a transmitter and receiver configuration at a set distance apart to measure subsurface electrical properties. The EM-31 operates on a single frequency

of 9,800 hertz and has peak sensitivity at a depth of about five feet below ground surface (bgs) and reasonable sensitivity to a depth of 18 to 25 feet bgs. A benefit of this technology is that functionality is not diminished by wet conditions. The EM-31 was used to collect terrain conductivity data to identify anomalies associated with fill materials or buried metal objects that would be indicative of a landfill or dumping. Terrain conductivity readings were collected at approximately one-foot stationing along EM survey profiles spaced approximately five to ten feet apart in accessible areas of the site. The stationing and survey profiles are illustrated on Figure 1 of RETTEW's geophysical report provided in **Appendix E**.

As discussed in RETTEW's geophysical report provided in **Appendix E**, the results of the EM-31 survey indicated that the subsurface conductivity data were indicative of natural terrain and not fill material, buried metallic objects, or dissolved salts/solids that are typically associated with landfills; however, metallic responses were observed at several locations. It was confirmed in the field that the metallic responses aligned with the presence of visible, surficial metallic debris, such as discarded paint cans, drums, and tire rims, as well as the presence of a buried steel drainpipe; however, it is possible that buried metallic objects beneath the surficial metallic debris may have gone undetected due to interference from the surficial metallic debris. Thus, the DQO of assessing evidence of demolition debris or disposal of other wastes in the AOC 5 possible dump area may not have been entirely achieved and the conditions discussed above may represent a data gap that will be further evaluated in a subsequent document that addresses the risk screenings and data gaps for all Phase 1 RI activities.

It is noted that a GPR survey was not conducted subsequent to the EM survey because, outside of the visible, surficial metallic debris discussed above, the results of the EM survey did not yield anomalies that warranted further inspection using GPR. Additionally, site conditions (i.e., metallic surface debris, partial snow cover, and pockets of standing water) were not conducive to performing a GPR survey and would have yielded results with a high degree of uncertainty due to interference from the visible, metallic surface debris and poor contact with the ground surface.

Safety and quality assurance/quality control (QA/QC) procedures outlined in *SOP No. 08 Electromagnetic (EM) 31 Geophysical Survey* of the UFP-QAPP (USACE, 2020b) were employed by the Bluestone personnel overseeing RETTEW. A summary geophysical report with a description of field activities, limitations of equipment, the results of the survey approach, corresponding figures, tables, raw data, and interpretations and conclusions is provided in **Appendix E.**

3.0 FIELD SAMPLING ACTIVITIES

Soil and groundwater sampling was conducted by Bluestone personnel from 7 to 15 January 2021 at AOC 5 and from 25 January to 5 February 2021 at AOC 4. Soil samples were collected using direct push technology (DPT). Surface samples were collected from 0 to 1 foot and subsurface samples from 1 to 5 feet bgs and 5 to 10 feet bgs at most locations. In some sample locations (e.g., AOC 4 drainage swales and discrete samples within ISM decision units [DUs]), samples were only collected from 1 to 5 feet bgs. The subsections below present a summary of activities associated with the field sampling program.

3.1 TARGET AREAS

Figures 2 and **3** show the sample locations and site layouts at AOC 4 and AOC 5, respectively. Each AOC was divided into target areas based on historical use. The following target areas were used during sampling at each AOC:

- AOC 4 (Former Bunker Area)
  - Drainage swales – West and East Igloo Roads
  - Three transects – eastern, western, and central AOC 4
  - Trench drain discharge – inside bunkers
- AOC 5 (Former Power Station)
  - Coal storage area
  - Former boiler house
  - Former electric substation
  - Possible dump area
  - Two coal aggregate storage bins – along the former rail spur

3.2 EQUIPMENT CALIBRATION

During the NYOW Phase 1 field event, equipment calibrations were performed in accordance with *SOP No. 02 Equipment Calibration and Maintenance* of the UFP-QAPP (USACE, 2020b). The combined calibration logs from AOC 4 and AOC 5 are provided in **Appendix F**. Procedures specified in the above-referenced SOP are summarized below as they pertained to field activities performed.

Prior to use, photoionization detectors (PIDs) were calibrated daily with a 2-point calibration (a zero calibration and a span calibration). Bluestone personnel took care to calibrate the PID away from any potential sources of contamination such as automotive exhaust, secondhand smoke, or perfumes/fragrances. First, the zero calibration was used to determine the zero point of the sensor calibration curve by using fresh air. The initial zero calibration occurs in fresh air for about 15 to 30 seconds. Next, the span calibration was used to determine the second point of sensor calibration. Isobutylene gas at a concentration of 100 parts per million (ppm) was used as the standard reference gas for the span calibration. A Tedlar® bag with silicone tubing was filled with 100 ppm concentration of isobutylene gas and then sealed. The Tedlar® bag was opened and connected to the PID in 2-point calibration mode. The PID was allowed to equilibrate for 30 seconds and the sensor curve was calibrated. If the zero calibration or the span calibration did not read within accepted ranges, the sensor was recalibrated. PIDs were replaced each week to avoid sensor drift and erroneous readings.

The YSI-Pro Plus multi-parameter water quality meter, specified in Worksheet #22 of the UFP-QAPP (USACE, 2020b), could not be ordered during the Phase 1 field event due to a rental shortage (see **Section**

5.0). A comparable multi-parameter water quality meter (Horiba U-52) was used instead to collect field data of the grab groundwater samples from the temporary monitoring wells. Similar to the specifications for the YSI-Pro Plus, calibration of the Horiba U-52 was performed each day prior to sample collection activities or when excess variability is noted. The key difference from the YSI-Pro Plus calibration, as specified in *SOP No. 02 Equipment Calibration and Maintenance* of the UFP-QAPP (USACE, 2020b), is that the Horiba U-52 only required a single-point calibration for specific conductance, oxidation-reduction potential (ORP), turbidity, pH, and dissolved oxygen (DO) using a manufacturer supplied calibration solution. Under extreme temperature conditions (air temperature less than 32°F), the meters were periodically checked for instrument drift and documented on the calibration logs.

3.3 SAMPLE NOMENCLATURE

As specified within Worksheet #18 of the UFP-QAPP (USACE, 2020b), each sample container was labeled with the project name, unique sample identification number, analysis method number, date and time collected, preservative (if any), and the sampler's initials. All samples were assigned a unique sample identifier (i.e., alpha-numeric code). The purpose of the numbering system was to assist in the tracking of samples and to facilitate retrieval of analytical results. The sampling numbers were used on the sample labels, sample tracking forms, chain of custody (CoC) forms, field logs, and all other applicable documentation.

For the NYOW Phase 1 field work, the field sample identifiers followed the *Recommended Naming Conventions for Locations, Field Samples, and Library File Nomenclature* – Appendix B of the most recent FUDSChem Database User's Manual in force when Event Planning was completed in FUDSChem. An example sample ID based on the January and February field events is presented for sample NYOW-04-SL001A: first labeled was the overall site name; followed by the AOC number; then surface (SL), subsurface (PH) sample, or groundwater (WL); the boring number; and finally, the depth interval from 0 to 1-foot bgs (A), from 1 to 5 feet bgs (B), or 5 to 10 feet bgs (C).

Worksheet #18 of the UFP-QAPP (USACE, 2020b) also specified naming conventions for QA/QC samples. Discrete sample field duplicates (FDs) were collected as blind to the laboratory. For the NYOW Phase 1 field work, the FD samples were labeled in the following format: Location Type-DUP-Sequence_ YYMMDD. For example, the FD collected on 7 January 2021 was labeled PH-DUP-001_210107. The time noted on the CoC was midnight or "0000" to keep the primary and duplicate sample association blind to the laboratory. The primary sample with which the duplicate is associated along with the actual collection time of the duplicate sample was noted in the field log. Matrix-spike/matrix-spike duplicates (MS/MSD) samples were named the same as the original sample location on the CoC.

Trip blanks, equipment blanks, and other blanks not tied to specific locations, were given unique names for the NYOW Phase 1 field work. The sample numbers were recorded in the following format: Blank Type-Number_YYMMDD, where Blank Type is an abbreviation indicating the type of blank (e.g., EB for equipment rinsate blank and TB for trip blank). For example, the first equipment rinsate blank collected on 7 January 2021 was labeled EB-01_210107. The equipment rinsed and sampling team which used the equipment was noted in the field log so that equipment rinsate blanks may be associated with the appropriate field samples.

3.4 SURFACE/SUBSURFACE SOIL SAMPLING

Each co-located surface/subsurface boring was marked in the field initially using a pin flag. Coordinates for each marked location were then recorded using a submeter global navigation satellite system (GNSS) receiver (EOS Arrow 100) GPS data collector. The Arrow calculates coordinates by averaging 30 GPS coordinate readings with a 2-foot accuracy range. GPS data collection followed the procedures identified in *SOP No. 04 Global Positioning Survey (GPS)* of the UFP-QAPP (USACE, 2020b). Bluestone contracted New York state licensed drilling company NDI to perform DPT soil sampling by way of a GeoProbe® 6610DT track-mounted rig. A 4-foot polyvinyl acetate liner was used inside a GeoProbe® Macro-Core® to penetrate the surface to the target depths or to refusal.

Figure 2 and **Figure 3** present the proposed and final locations for borings installed at AOC 4 and AOC 5, respectively. In two instances, NYOW-05-017 and NYOW-05-018, refusal occurred at less than 10 feet bgs; therefore, the proposed sample locations were moved to a location that allowed for a minimum of 10 ft bgs boring depth. Deviations from original sampling locations are summarized in **Section 5.0**.

For each 4-foot interval of the boring, the acetate liners were cut open by NDI for Bluestone personnel to screen with the PID every six inches for the presence (or absence) of organic vapors. Soils were left within the acetate sleeve prior to screening. No volatile organic vapors were detected from any borings installed at AOC 4 or AOC 5. However, petroleum-like odors were detected in shallow soil (0 to 1-foot bgs) collected from the borings located in the trench drain discharge at Bunker 1 (NYOW-04-031 and NYOW-04-032) and Bunker 2 (NYOW-04-026 and NYOW-04-027). The petroleum odors were not mentioned in the DQCR because the PID response and visual observation (i.e. lack of staining) did not support olfactory observations. No volatile organic compound (VOC) samples were collected from these intervals because VOC analysis was not included in the sampling plan for AOC 4. Bunkers 1 and 2 (located within DU001 and DU002 of AOC 4, respectively) are currently being used by the NYSDEC for equipment maintenance and storage. Bluestone informed CENAE personnel and discussed the petroleum-like odors with Joshua Cook (NYSDEC project manager) during his site visit on 1 February 2021.

Following PID screening, each 4-foot interval was photographed/georeferenced using the ArcGIS Collector application and logged on electronic tablets using pre-designed spreadsheets. Select photographs of the collected soil intervals are provided in **Appendix D**.

Bluestone field personnel followed soil logging procedures outlined in *SOP No. 11 Geologic Logging* of the UFP-QAPP (USACE, 2020b). Soil logs included the following information:

- depth – distance in feet below surface;
- location – coordinates collected using a submeter-accuracy GNSS receiver (EOS Arrow 100);
- American Society for Testing Materials (ASTM) code – was utilized and refers to the United Soil Classification System (USCS) of logging soils;
- lithology code – the lithologic description and classification of soils per ASTM code;
- Munsell color code – refers to Munsell color system number that represents the color of soil;
- moisture – a qualitative measurement of water content in soil (e.g., dry, moist, or wet);
- PID reading – measurement collected following opening of acetate liner (described above); and
- odor – a qualitative measure of apparent scent of soil (e.g., no odor, petroleum-like, or sulfur-like).

As mentioned, the above information was recorded using electronic tablets and pre-designed spreadsheets for each surface sampling location. The spreadsheets were designed to provide enhanced QA/QC measures

and allow for scripted uploads into soil logging software and additional databases. All boring logs underwent QA/QC performed by both the Bluestone project manager and project geologist. Combined soil boring and temporary monitoring well installation logs are provided in **Appendix G**.

AOC-specific analytes are detailed below:

- AOC 4
  - Surface soil: dinitrochlorobenzene (DNCB), 2,4-dinitrophenol (2,4-DNP), and picric acid.
  - Subsurface soil: DNCB, 2,4-DNP, and picric acid.
- AOC 5
  - Surface soil: Target analyte list (TAL) metals, semi-volatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs); subset for total organic carbon (TOC), grain size distribution (including hydrometer analysis), and cation exchange capacity (CEC). Surface samples collected at the coal storage area and the pit area were analyzed for coal ash (using microscopy by MicroVision Laboratories, Inc. [MicroVision]) but not SVOCs. Polychlorinated biphenyls (PCBs; Aroclors) were analyzed in samples collected in the substation and possible dump areas.
  - Subsurface soil: TAL metals, SVOCs, and PAHs; subset for TOC, grain size distribution (including hydrometer analysis), and CEC. VOCs and PCBs (Aroclors) also were analyzed in samples collected in the possible dump area.

Following logging of each soil interval, samples were collected in accordance with *SOP No. 16 Surface Soil Sampling* and *SOP No. 15 Subsurface Soil Sampling* of the UFP-QAPP (USACE, 2020b). No elevated PID readings were encountered during screening of the AOC 4 and 5 borings; therefore, VOC samples were collected from undisturbed soil from the center of the sampling interval, in accordance with the UFP-QAPP (**Section 17.6.3**). For non-VOC samples, the entirety of each soil interval (e.g., 0-1 feet bgs, 1-5 feet bgs, and 5-10 feet bgs) was removed from the acetate liner and placed into a corresponding plastic bag. The soil within each bag was then homogenized. Once homogenized the non-VOC samples were placed directly into laboratory-supplied bottles/jars. Extra soil not included in the samples was placed in five-gallon buckets throughout the day and then moved to the staging area. Excess soil was then dumped into the appropriately labeled 55-gallon drum (per AOC) at the end of every workday. The acetate liners, plastic sheeting, and other disposable materials (i.e., nitrile gloves associated with soil logging) were placed in large trash bags and put into the staging area dumpster prior to demobilization for the day.

At the locations where only a primary sample was collected, sufficient volume was recovered from the Macro-Core to meet the sampling volume requirements. The only locations that required additional soil volume were locations where QA/QC samples were also collected. This additional sampling was strictly due to insufficient volume recovered from the Macro-Core. In cases where insufficient volume was acquired for QA/QC sampling, additional soil was collected either by hand or by advancing a second Macro-Core within 1-foot of the original boring. Specifically, the surface soil volume at AOC 5 was insufficient for the planned QA/QC samples and a disposable sampling scoop/shovel was used to collect additional soil volume. In AOC 4, a second Macro-Core was installed from the 0 to 1-foot bgs interval to collect sufficient soil volume for the QA/QC samples. The additional soil was screened with a PID and evaluated along with the original soil core for logging.

The remainder of the collected soil in excess of the required sample volume was placed into a 55-gallon drum for subsequent IDW sampling and disposal. Non-dedicated or non-disposable equipment was

decontaminated prior to its next use. Further discussion of decontamination procedures and IDW management is provided in **Section 3.6** and **Section 3.8** of this report, respectively. All soil borings that were not converted to temporary monitoring wells were backfilled with bentonite, in accordance with SOP No. 01 Abandonment of Monitoring Wells and Piezometers of the UFP-QAPP (USACE, 2020b).

At AOC 4, a total of 16 surface and 101 subsurface soil samples were collected. Additionally, QA/QC samples were collected as follows: 13 FDs, 7 MS/MSD pairs, and 8 equipment blanks (one per day of soil sampling). At AOC 5, a total of 25 surface and 50 subsurface soil samples were collected, with QA/QC samples as follows: 8 FDs, 5 MS/MSD pairs, and 6 equipment blanks (one per day of sampling). Given that the number of QA/QC samples and target percentages are based on a site-wide program for each matrix, the frequency will be presented in a separate document that further addresses data usability, the Phase 1 RI risk screenings, data gaps, and recommendations for additional RI field activities as needed (i.e., Phase 2), as discussed in **Section 1.0**. Analytical results are summarized within **Section 4.0**.

3.5 GROUNDWATER SAMPLING

At refusal, and upon completion of logging and soil sampling, select boreholes were converted into temporary monitoring wells. A grab groundwater sample was collected from each temporary monitoring well after a minimum of 24 hours following installation. A total of 16 temporary wells were constructed at AOC 4, ranging from 10.5 to 20.5 feet bgs. Twelve temporary wells were installed at AOC 5 ranging in depth from 19 to 29 feet bgs. Temporary wells were installed following the procedures identified within *SOP No. 03 Design and Installation of Monitoring Wells and Well Development* of the UFP-QAPP (USACE, 2020b). A summary of temporary well construction and installation is provided below.

The temporary monitoring wells were constructed with one-inch diameter, schedule 40 PVC riser pipe and a minimum five-foot well screen (slot size .010), with flush joint threads and a bottom cap. The filter pack consisted of 0.45 to 0.55 millimeter (formerly #00) clean silica sand distributed around the well screen to two feet above the top of the screened interval. A bentonite seal (minimum of two feet) was placed above the filter pack to the ground surface using bentonite chips or pellets and hydrated to provide a seal. Wells were completed as one of three types: flush-mount to the ground surface, PVC stick-up within a locked steel protective outer casing, or as a stand-alone PVC stick-up. In most cases, the temporary monitoring wells were completed as stick-up wells. In areas where the wells were at risk of damage or visible to the general public, the wells were completed with steel outer casing and a locking lid. Although NYOW-05-016 is also located in this same area, it was completed as a locking stick-up due to its location in a runoff swale and potential for inundation by surface water during future sampling events. The stand-alone PVC stick-up wells were installed in undisturbed areas where access was limited, and the risk of tampering was reduced.

The construction of each temporary monitoring well is included below:

- Flush-mount;
    - AOC 4: none installed
    - AOC 5: NYOW-05-017-1 and NYOW-05-019
- Locked, steel-cased stickup; and
    - AOC 4: NYOW-04-001 through NYOW-04-006, NYOW-04-036, and NYOW-04-079 through NYOW-04-085
    - AOC 5: NYOW-05-016
- PVC stick-up.

  - AOC 4: NYOW-04-037 and NYOW-04-038
  - AOC 5: NYOW-05-001, NYOW-05-004 through NYOW-05-006, NYOW-05-008, NYOW-05-010, NYOW-05-012, NYOW-05-024, and NYOW-05-025

Following the second Phase 1 field event (spring 2021, AOC 1 and AOC 3), surface elevations at the temporary monitoring wells were surveyed by a NY licensed surveyor. The coordinates and elevations of the ground surface and measuring points (top of PVC) of the temporary monitoring wells were surveyed and are provided on the boring logs in **Appendix G**. Surface elevations of the soil borings not converted to temporary monitoring wells were not intended to be surveyed, nor were these data collected with the Arrow GPS because of the wide range of accuracy (1-2 m) for surface elevation measurements; however, the coordinates collected with the Arrow GPS are included on the boring logs (**Appendix G**). Combined soil boring and temporary monitoring well installation logs are provided in **Appendix G**.

Groundwater samples were collected in conjunction with the DPT soil investigation and followed the procedures identified in *SOP No. 12 Low-Flow Groundwater Sampling and Sampling with a Bailer* of the UFP-QAPP (USACE, 2020b). Prior to sampling, depth-to-water and total depth measurements were collected from ground surface using a Solinst® Model 122 Interface Meter (in case light non-aqueous phase liquid [LNAPL] is encountered). In accordance with discussions with CENAE on 26 March 2020, 15 January 2021, and 18 March 2021 and documented in meeting minutes, temporary monitoring wells were not developed. Discrete groundwater samples were collected using a peristaltic pump as grab samples, in accordance with the UFP-QAPP (USACE, 2020b). Specifically, upon initial discharge of groundwater from the sampling tubing, the field water quality parameters were measured, and samples were collected without development, purging, or field parameter stabilization. The flow rates during peristaltic pumping were maintained at 0.1 to 0.67 liters per minute (L/min) to prevent degassing of volatiles. During pumping, no odors or PID readings were observed. Volatile samples were collected first in the sequence and the low flow rate was maintained to minimize aeration, bubble formation, turbulent filling of the bottles, and loss of VOCs due to long residence time in the tubing.

Field parameters were collected and measured using a Horiba U-52 with a flow-through cell and recorded on the purge log. Purge logs were recorded on electronic tablets using pre-designed spreadsheets by Bluestone field personnel and are provided in **Appendix H**. Information recorded on the purge logs included:

- general project information;
  - site name, location, and date
  - well and sample ID
- initial well conditions;
  - construction details
  - PID reading
  - static depth to water/depth to bottom
  - well volume
- purge information;
  - pump type
  - pump depth
  - time of reading
  - flow rate/cumulative volume purged
  - depth to water at time of reading

- field parameters; and
    - pH
    - ORP
    - turbidity
    - temperature
    - DO
    - specific conductivity
- sample information.
    - color and odor
    - analytical methods
    - bottle type and quantity
    - sample time and sampler initials
    - quality control (QC) sample information (if applicable)

AOC-specific groundwater analytes are detailed below:

- AOC 4
    - Groundwater (grab samples): DNCB, 2,4-DNP, and picric acid.
- AOC 5
    - Groundwater (grab samples): TAL metals (field-filtered), SVOCs, and PAHs. VOCs and PCBs (Aroclors) also were analyzed in samples collected in the possible dump area.

Due to the potential for elevated turbidity in the grab groundwater samples, aliquots for metal and inorganic constituents were field filtered when filling the sample bottles. Aliquots for SVOC and explosives analyses were collected first since they were not specified in the UFP-QAPP (USACE, 2020b) to be field filtered. The temporary wells were left in place in order to obtain a synoptic round of water levels from all four AOCs and the background area. Water levels were measured after Phase 1 field sampling activities were completed in late spring 2021.

At AOC 4, a total of 16 groundwater samples were collected. Additionally, QA/QC samples were collected as follows: 2 FDs, 1 MS/MSD pair, and 3 equipment blanks (one per day of groundwater sampling). At AOC 5, a total of 12 groundwater samples were collected. Additionally, QA/QC samples were collected as follows: 2 FDs, 1 MS/MSD pair, 5 equipment blanks (one per day of groundwater sampling), and 3 trip blanks (one per cooler with groundwater VOC samples). Given that the number of QA/QC samples and target percentages are based on a site-wide program for each matrix, the frequency will be presented in a separate document that further addresses data usability, the Phase 1 RI risk screenings, data gaps, and recommendations for additional RI field activities as needed (i.e., Phase 2), as discussed in **Section 1.0**. Analytical results are summarized within **Section 4.0**.

3.6 DECONTAMINATION PROCEDURE

Dedicated, disposable sampling equipment (sample spoons and Macro-Core, PVC inner sleeves) was used throughout the soil and groundwater sampling investigation at both AOC 4 and AOC 5. However, the outer stainless steel Macro-Cores used by NDI and trowels used by Bluestone to split soil for PID screening were thoroughly decontaminated before and after each use. Decontamination procedures were performed in accordance with *SOP No. 05 Decontamination of Field Equipment* of the UFP-QAPP (USACE, 2020b). The decontamination procedure used by NDI included the use of two buckets filled with fresh deionized

water, Liquinox®, and scrub brushes. The first bucket was filled with deionized water and Liquinox® to create a one percent solution. Liquinox® is a concentrated anionic detergent used for cleaning and decontaminating field equipment. The equipment was scrubbed to remove any remaining soil or vegetation in the first vessel. The equipment was rinsed in the second bucket with water, without Liquinox®. Bluestone used a scrub brush and separate spray bottles with a deionized water/Liquinox® solution, dilute nitric acid, and dilute methanol to decontaminate the trowel in accordance with SOP No. 05 Decontamination of Field Equipment of the UFP-QAPP (USACE, 2020b). After each solution application, the trowel was rinsed with deionized water from a separate spray bottle. A single bucket was used by Bluestone to capture cleaning solutions and rinse water. Equipment decontamination occurred within the decontamination pad located at the staging area in AOC 4, as well as in work areas outside of the decontamination pad. The disposal of decontamination fluids is discussed within **Section 3.8**.

3.7 INVASIVE SPECIES MITIGATION

NYSDEC has observed and mapped the occurrences of swallow-wort (an invasive plant species) within AOC 4 that overlapped with several boring locations. In accordance with the UFP-QAPP comments provided by NYSDEC on 21 October 2020, Bluestone implemented measures to mitigate the spread of swallow-wort both within and beyond the Three Rivers Wildlife Management Area (AOC 4), including avoidance and the use of both engineering and procedural controls. Mapped swallow-wort areas were avoided through the relocation of some borings (see **Section 5.0**) and through keeping support trucks and the DPT rig on the roadway. Specifically, the DPT rig accessed the swale boring locations from the roadway while the driller worked in and around the swale. This approach was also applied during the installation of the eastern transect borings/temporary monitoring wells. **Figure 2** presents the previously mapped areas provided by NYSDEC and proposed/final locations for borings impacted by swallow-wort.

Where avoidance was not possible (bunker discharge borings could not be relocated), NDI set the rig on plastic sheeting in areas where the swallow-wort was mapped. To minimize the risk of slips, trips, and falls, only the rig and probe base were set on plastic sheeting. NDI took precautions to not walk on the plastic sheeting. Initially, NDI set plywood on top of the plastic to provide stability for the rig, but the plywood broke under the weight of the rig due to unstable terrain resulting from the snow cover. At all subsequent boring locations in areas of swallow-wort, NDI cleared excessive snow, leaving a few inches of snow to cover vegetation and laid down plastic, which minimized the risk of swallow-wort spread. After sampling was completed and the rig was moved, the plastic sheeting was carefully folded in a manner to prevent dispersion of any materials adhered to the bottom of the sheeting and placed into a 30-gallon plastic garbage bag for disposal, in accordance with the specifications set forth by the NYSDEC.

To further mitigate disturbance and spread of the swallow wort, the borings were installed using a clean to dirty approach. Borings located outside of mapped or observed swallow-wort areas were installed first, then the locations that required plastic sheeting were installed, and the borings where avoidance and engineering controls were not possible were installed last. The latter location included borings NYOW-04-001, NYOW-04-010, and NYOW-04-011. After these three borings were installed, the rig and mini-excavator, which was used to pull the rig up the snow-covered slope to access NYOW-04-001, were sprayed using a pressurized steam cleaner and wash water was allowed to discharge directly to the ground surface. The rig and mini-excavator were spray-washed in the gravel access driveway of Bunker 6 where the swallow-wort was already observed.

3.8 INVESTIGATION-DERIVED WASTE (IDW)

Excess soil generated from surface and subsurface sampling (i.e., soil cuttings) and decontamination/purge water was containerized separately for each AOC in 55-gallon drums. Storage and management of IDW was performed in accordance with *SOP No. 10 Storage and Sampling of Investigation-Derived Waste (IDW)* of the UFP-QAPP (USACE, 2020b). All IDW drums were staged on plastic and within secondary containment in the fenced staging area at the NYSDEC field office parking lot at AOC 4. One soil cuttings drum and two decontamination/purge water drums were accumulated from AOC 4 sampling. One soil cuttings drum and one decontamination/purge water drum were accumulated from AOC 5. The decontamination/purge water drums predominantly consist of decontamination water. All drums containing IDW were properly labeled as Non-Hazardous – Pending Analysis. Subsequent to demobilizing from the site, Bluestone used the preliminary analytical data for sampling performed at AOC 4 and AOC 5 to evaluate the toxicity hazardous waste characteristic of the IDW for the purpose of determining if the Non-Hazardous – Pending Analysis designation was accurate.

The preliminary analytical data for AOC 4 indicated that there were no detections for 2,4-DNP, which is the only listed waste that was analyzed for in the AOC 4 samples; therefore, the Non-Hazardous – Pending Analysis designation for the AOC 4 IDW was determined to be accurate.

For the IDW generated from AOC 5 sampling, Bluestone performed a total waste analysis to determine the toxicity hazardous waste characteristic and applied the Toxicity Characteristic Leaching Procedure (U.S. Environmental Protection Agency [EPA] Method 1311) 20-times rule to determine maximum leachable concentrations. The 20-times rule is an application of Section 1.2 of EPA Method 1311 where the results of the total constituent analysis may be divided by twenty to convert the total results into the maximum leachable concentration. The application of the 20-times rule to AOC 5 preliminary site soil data indicated that all listed wastes were below the Resource Conservation and Recovery Act (RCRA) criteria for the identification and listing of hazardous waste (40 CFR 261.3, Subpart A 261.3); therefore, the Non-Hazardous – Pending Analysis designation for the AOC 5 IDW was determined to be accurate.

Materials such as nitrile gloves, plastic sheeting, plywood, and disposable sampling equipment (including tubing and filters) were not considered IDW and were placed in the staging area dumpster.

IDW drums were not sampled for disposal during the investigation at AOC 4 and AOC 5. Upon completing the remaining site investigation activities at AOC 1, AOC 3, and the background area, IDW from each AOC was sampled individually on 19 May 2021 to characterize the waste from each area and to generate waste profiles for proper disposal. Waste profiles were provided to CENAE on 3 June 2021. Results from the IDW sampling will be included in the RI Phase 1 Field Report for AOCs 1 and 3, AOC 4 ISM, and background.

3.9 SAMPLE DELIVERY AND CHAINS OF CUSTODY

Completion of CoCs, packaging of samples, and shipment of coolers to the laboratory was performed in accordance with *SOP No. 13 Sample Packaging and Shipping* SOP of the UFP-QAPP (USACE, 2020b). All samples were placed in a cooler with ice immediately after collection. The cooler bottoms were lined with bubble wrap, a layer of bagged ice, then double-bagged samples and finally another layer of bubble wrap. The CoCs were placed in a sealed plastic bag and placed on top of the upper layer of bubble wrap. The coolers were transported the Eurofins/TestAmerica service center in Syracuse, NY via laboratory courier daily. The coal ash samples collected from the surface soil at the AOC 5 coal storage area were

shipped via FedEx to MicroVision located at 187 Billerica Road in Chelmsford, Massachusetts since they required microscopic analyses to determine the presence of particulates associated with coal ash.

From the Syracuse service center, all samples, except for SVOCs, were shipped to Eurofins TestAmerica Denver located at 4955 Yarrow Street in Arvada, Colorado for analysis. Soil and groundwater samples analyzed for SVOCs were shipped to Eurofins TestAmerica Savannah located at 5102 La Roche Ave in Savannah, Georgia. Eurofins TestAmerica was the laboratory selected to perform chemical analysis of the environmental samples during the cost proposal phase. Additionally, MicroVision was selected to perform microscopic analysis of the coal ash samples collected in AOC 5.

Combined CoCs, including relevant correspondence with the laboratory, for the AOC 4 and AOC 5 soil and groundwater samples can be found in **Appendix I**. The following exceptions were noted with applicable CoC ID:

- 280-144621 – as noted in the 18 January 2021 email from Eurofins/TestAmerica, the grain size sample (NYOW-05-PH012-B) was damaged during shipment from the Eurofins TestAmerica Denver laboratory to Eurofins TestAmerica Seattle. The issue was rectified with the Eurofins TestAmerica Denver shipping department; however, there was not sufficient, additional volume from other analyses to be used in lieu of the compromised sample. Usable results for grain size distribution were not obtained for the 1-5 feet bgs interval for this location, resulting in a neutral bias.
- 280-144913 – as noted in the 25 January 2021 email from Bluestone, equipment blank EB-01_210125 was listed for 8330A Explosives and 8330B Explosives on the CoC instead of 8270D SVOCs and 8330B Explosives. Data quality and usability are not impacted by this exception.
- 280-144913 – as noted in the 27 January 2021 email from Eurofins/TestAmerica, confirmation was required that only six containers for sample NYOW-04-PH035-B were needed as opposed to the nine containers listed on the CoC. Bluestone confirmed with Eurofins/TestAmerica that the nine containers listed on the CoC was a typo and only six were shipped for the specified sample. Data quality and usability are not impacted by this exception.
- 280-145209 – as noted in the 5 February and 8 February 2021 email correspondence, the "-B" was erroneously left off the CoC sample ID for NYOW-04-PH074-B and NYOW-04-PH075-B (containers were correctly labeled). Data quality and usability are not impacted by this exception.

3.10 SAMPLE ANALYSIS

Based on the historical use of each AOC, the targeted analyte list is not uniform across all AOCs and the corresponding background samples. Percent moisture analysis was conducted on all soil samples except those collected for coal ash analysis.

AOC-specific analytes are detailed below:

- AOC 4
  - Surface soil: DNCB (EPA Method 8270D), 2,4-DNP (EPA Method 8270D), and picric acid (EPA Method 8330A).
  - Subsurface soil: DNCB (EPA Method 8270D), 2,4-DNP (EPA Method 8270D), and picric acid (EPA Method 8330A).
  - Groundwater (grab samples): DNCB (EPA Method 8270D), 2,4-DNP (EPA Method 8270D), and picric acid (EPA Method 8330B).

- AOC 5
  - Surface soil: Target analyte list (TAL) metals (EPA Methods 6010C, 6020A, and 7471B), SVOCs (EPA Method 8270D), and PAHs (EPA Method 8270D-SIM); subset for TOC (EPA Method 9060A), grain size distribution (including hydrometer analysis; ASTM Method D422), and CEC (EPA Method 9081/6010B). Surface samples collected at the coal storage area and the pit area were analyzed for coal ash (using microscopy by MicroVision) but not SVOCs. PCBs (Aroclors; EPA Method 8082A) were analyzed in samples collected in the substation and possible dump areas.
  - Subsurface soil: TAL metals (EPA Methods 6010C, 6020A, and 7471B), SVOCs (EPA Method 8270D), and PAHs (EPA Method 8270D-SIM); subset for TOC (EPA Method 9060A), grain size distribution (including hydrometer analysis; ASTM Method D422), and CEC (EPA Method 9081/6010B). Volatile organic compounds (VOCs) (EPA Method 8260C) and PCBs (Aroclors; EPA Method 8082A) also were analyzed in samples collected in the possible dump area.
  - Groundwater (grab samples): TAL metals (field-filtered; EPA Methods 6010C, 6020A, and 7470A), SVOCs (EPA Method 8270D), and PAHs (EPA Method 8270D-SIM). VOCs (EPA Method 8260C) and PCBs (Aroclors; EPA Method 8082A) also were analyzed in samples collected in the possible dump area.

4.0 ANALYTICAL RESULTS

This section presents the analytical data generated from Phase 1 RI field activities conducted at AOC 4 and AOC 5. A separate document that further addresses data usability, the Phase 1 RI risk screenings, data gaps, and recommendations for future RI field activities as needed (i.e, Phase 2) will be prepared and provided to stakeholders following the completion of the RI Phase 1 Field Reports, which are intended only to summarize field activities.

Analytical data were uploaded to FUDSChem by Eurofins/TestAmerica and then validated by Bluestone. The data validation was performed in accordance with the United States (U.S.) Department of Defense (DoD) *General Data Validation Guidelines* (DoD, 2019), the U.S. DoD *Data Validation Guidelines Module 1* (DoD, 2020), the EPA *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA, 2017a), the EPA *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA, 2017b), the UFP-QAPP (USACE, 2020b), and the specifics of the methods employed. With the exception of CEC and grain size distribution, the items subject to review were consistent with Stage 2B electronic and manual validation (S2BVEM) and included review of quality control results and instrument calibration. CEC and grain size distribution were validated consistent with a Stage 1 Manual Validation (S1VM), and included review of receipt conditions and completeness.

Validated analytical results for the soil and groundwater samples collected at AOC 4 and AOC 5 are provided as **Appendix J**. Detected constituents in AOC 5 soil and groundwater are summarized on **Table 1** and **Table 2**, respectively. Project action limit (PAL) exceedances within AOC 5 are depicted on **Figure 4a** through **Figure 4e** for soil and **Figure 5** for groundwater. Summary tables are not provided within this section for AOC 4 because the constituents of interest (DNCB, 2,4-DNP, and picric acid) were not detected in any of the 130 soil samples or 18 groundwater samples collected during this field effort.

These results indicate the following for soil and groundwater at AOC 4 and AOC 5:

- AOC 4
  - Soil
    - Results for 130 soil samples indicated that all analytes were non-detect.
  - Groundwater
    - Results for 18 groundwater samples indicated that all analytes were non-detect.
- AOC 5
  - Soil
    - Detected constituents within AOC 5 soil included 23 metals, 1 PCB, 18 PAHs, 3 SVOCs, and 4 VOCs (**Table 1**).
    - Maximum detected concentrations of the following constituents exceeded PALs: aluminum, antimony, arsenic, benzo(a)pyrene, benzo(b)fluoranthene, cadmium, chromium, cobalt, copper, dibenz(a,h)anthracene, dibenzofuran, di-n-butyl phthalate, indeno(1,2,3-c,d)pyrene, iron, lead, manganese, mercury, naphthalene, selenium, thallium, vanadium, and zinc.
  - Groundwater
    - Detected constituents within AOC 5 groundwater included 17 metals, 16 PAHs, 2 SVOCs, and 1 VOC (**Table 2**).
    - Maximum detected concentrations of the following constituents exceeded PALs: aluminum, antimony, arsenic, benzo(a)anthracene, benzo(a)pyrene,

benzo(b)fluoranthene, cobalt, dibenz(a,h)anthracene, iron, manganese, naphthalene, and sodium.

The Phase 1 human health and ecological risk screenings will be presented in a separate document, as discussed in **Section 1.0** and the beginning of this section, and will evaluate the constituents, as appropriate, with limits of detection, limits of quantitation, or detected results exceeding PALs in soil and groundwater at AOCs 4 and 5, as well as the frequency and magnitude of exceedances.

The results of coal ash sampling performed at the AOC 5 coal storage area are summarized in **Table 3**. The complete report prepared by MicroVision is provided as **Appendix K**. Coal was detected in moderate to very heavy concentrations in all samples submitted for analysis, excluding sample NYOW-05-SL022-A. Coal ash was detected in trace to moderate concentrations in samples NYOW-05-SL022-A and NYOW-05-SL024-A. Coal ash results will be further evaluated in a separate document, as discussed in **Section 1.0** and the beginning of this section, to aid in the interpretation of PAH concentrations detected within the AOC 5 coal storage area.

5.0 DEVIATIONS FROM UNIFORM FEDERAL POLICY FOR QUALITY ASSURANCE PROJECT PLAN (UFP-QAPP)

This section discusses deviations from the UFP-QAPP (USACE, 2020b) for Phase 1 RI field activities conducted at AOC 4 and AOC 5. A separate document that further evaluates these deviations, their impact on data usability and representativeness, resulting data gaps, and recommendations for future RI field activities as needed (i.e, Phase 2) will be prepared and provided to stakeholders following the completion of the RI Phase 1 Field Reports, which are intended only to summarize field activities.

Deviations from the UFP-QAPP (USACE, 2020b) are described below by category. In addition, general statements are included regarding whether DQOs were met in consideration of the variance.

5.1 STAGING AREA RELOCATION

Upon receiving right of entry for AOC 4 on 4 January 2021, the staging area was moved from AOC 5 to AOC 4. The relocation of the staging area did not affect meeting DQOs.

5.2 EQUIPMENT

The UFP-QAPP (Worksheet #22; USACE, 2020b) indicated a YSI-Pro Plus multimeter with a flow-through cell would be used. However, a YSI multimeter was not available and a Horiba U-52 multi-parameter water quality meter was used to collect field data of the grab groundwater samples from the temporary monitoring wells instead. The instruments are comparable, resulting in a neutral bias. The deviation did not affect meeting DQOs.

5.3 SAMPLE LOCATION CHANGES

Several sample locations were modified from the proposed locations due to the following:

- Swallow-wort, wetlands, or gravel pile avoidance;
- Buffer between site activities and a red-tailed hawk nest;
- Refusal;
- Drill rig access issues; or
- Dry temporary well.

Sample locations for AOC 4 and AOC 5 are provided on **Figure 2 and Figure 3**, respectively – any modifications to the original, proposed locations are noted on the figures and described by category below. The relocation of these borings fell within the footprint of the AOC of the original locations; therefore, DQOs were still achieved.

5.3.1 Swallow-wort Avoidance

As noted in **Section 3.7**, Bluestone implemented measures to mitigate the spread of the invasive species, swallow-wort. These measures included avoidance and the use of both engineering and procedural controls. Mapped swallow-wort areas were avoided through the relocation of borings as noted below. Soil and groundwater sampling were completed at each of these eastern transect locations.

Boring Location ID	Approximate Distance and Direction of Relocation
NYOW-04-080	20 feet west
NYOW-04-081	40 feet northwest
NYOW-04-082	20 feet west
NYOW-04-084	15 feet west
NYOW-04-085	35 feet west

Figure 2 shows the relocated soil borings with respect to previously mapped areas of swallow-wort by NYSDEC.

5.3.2 Wetlands Avoidance

To reduce the impact to sensitive habitats areas, mapped wetland areas were avoided through the relocation of borings as noted below.

Boring Location ID	Location/Medium Description	Approximate Distance and Direction of Relocation
NYOW-04-003	western transect/soil and groundwater	75 feet north
NYOW-04-005	western transect/soil and groundwater	20 feet northeast
NYOW-05-006	Possible Dump Area/soil and groundwater	20 feet south
NYOW-05-010	Coal Storage Area/soil and groundwater	35 feet northeast

5.3.3 Gravel Pile Avoidance

NYOW-04-083 (eastern transect soil and groundwater location) was relocated approximately 30 feet northwest along East Igloo Road to avoid a gravel pile that was present in the original location.

5.3.4 Red-tailed Hawk Nest Buffer

NYOW-04-036 (central transect soil and groundwater location) was relocated approximately 70 feet northwest to add a buffer between the location and a nearby red-tailed hawk nest.

5.3.5 Refusal

On 14 January 2021, the proposed monitoring well location NYOW-05-017 (soil and groundwater location) hit shallow refusal at 5 feet bgs; therefore, the location was offset five feet to the north, designated NYOW-05-017-1 and advanced to 29 feet bgs. As this new location falls within the footprint of the former boiler house, the DQO was achieved.

5.3.6 Drill Rig Access

On 1 February 2021, the proposed monitoring well location NYOW-04-006 (western transect soil and groundwater location) was shifted 30 feet to the southwest, closer to the road to avoid the roadside drainage swale that the drill rig was unable to traverse. In addition, the rig was unable to access the original NYOW-04-006 location from the north along the service road between West Igloo and East Igloo Roads due to the soft ground surface beneath the snowpack. This DPT location was originally sited at the southern end of

the Western Transect to determine if groundwater discharges to the surface water body to the southwest. The relocation was sufficiently close to the original location as to still achieve the DQO.

5.3.7 Dry Temporary Well

On 13 January 2021, the proposed monitoring well location NYOW-05-015 hit refusal at 25.5 feet bgs (above the saturated zone). Soil samples were collected from this boring, but no monitoring well was installed at this location. Instead, a monitoring well was installed at the NYOW-05-016 location in the saturated zone at a depth of 28 feet bgs. Both soil and groundwater samples were collected from location NYOW-05-016. NYOW-05-015 was intended to evaluate groundwater conditions, in conjunction with NYOW-05-012, at the former substation. Relocation of the temporary monitoring well to NYOW-05-016, adjacent to the former boiler house, maintained the DQO of evaluating groundwater at AOC 5. Groundwater samples were obtained from both the former substation at NYOW-05-012 and from the former boiler house at NYOW-05-016.

5.4 SAMPLE DEPTH

NYOW-05-018 was installed to 6 feet bgs after three attempts (shallow refusal was due to concrete). Sample was collected from the 5-6 foot interval as opposed to the 5-10 foot interval. Soil was collected from the 5-10 foot interval in the four other soil borings associated with the former boiler house, which should provide sufficient information to achieve the DQO of determining if further investigation of the area is necessary.

5.5 SAMPLE VOLUME

Insufficient recharge was encountered at the following monitoring well locations:

- NYOW-04-037 (sampled 4 February 2021);
- NYOW-04-082 (sampled 4 February 2021); and
- NYOW-04-038 (sampled 5 February 2021).

Therefore, the minimum required volume of water was collected for methods 8270D (one liter, instead of two liters) and 8330B (one-half liter, instead of one liter). This did not cause an elevation in the detection limits for method 8270D and detection limits for method 8330B were still lower than the PAL.

5.6 SUMMARY

Deviations from the UFP-QAPP did not affect meeting the project DQOs. As discussed in **Section 1.0** and the beginning of this section, these deviations and their impact on data usability and representativeness will be further evaluated in a separate document that will be prepared and provided to stakeholders following the completion of the RI Phase 1 Field Reports, which are intended only to summarize Phase 1 field activities.

6.0 PRELIMINARY DATA USABILITY ASSESSMENT

This section presents a preliminary data usability assessment for Phase 1 RI field activities conducted at AOC 4 and AOC 5. A separate document that further assesses data usability impacts, resulting data gaps, and recommendations for future RI field activities as needed (i.e, Phase 2) will be prepared and provided to stakeholders following the completion of the RI Phase 1 Field Reports, which are intended only to summarize field activities.

A Data Usability Assessment integrates the sampling and analytical activities to determine if project goals have been met, to determine if the data may be used as intended, and to identify limitations on data use. The data quality indicators (DQIs) (i.e., precision, accuracy, representativeness, comparability, completeness, and sensitivity) help to assess data usability. A preliminary assessment of the AOC 4 and AOC 5 data usability is below. In-depth discussions of data quality and usability, including whether the number of QA/QC samples met the site-wide target percentages for each matrix, will be presented in a separate document, as discussed in **Section 1.0** and the beginning of this section.

6.1 PRECISION

Precision measures the agreement among a set of replicate measurements. Analytical precision is estimated using laboratory control spike (LCS)/laboratory control spike duplicate (LCSD) pairs or MS/MSD pairs. Field and analytical precision are evaluated using FD sample pairs. The most commonly used estimates of precision when only two samples are available is the relative percent difference (RPD). The RPD is calculated as the absolute value of the difference between two results divided by the arithmetic mean of the results. The RPDs for QC sample pairs were within the precision limits presented in the UFP-QAPP (USACE, 2020b), with the exceptions noted below.

- Multiple LCS/LCSD RPDs and MS/MSD RPDs were greater than the control limit for SVOCs (20%) and picric acid (30% for solid and 20% for aqueous) associated with soil and groundwater samples collected from AOC 4. The sample results were non-detect and were not qualified.
- Multiple LCS/LCSD and MS/MSD RPDs were greater than the control limit for SVOCs (20%), metals (20%) and base neutral acid-selective ion monitoring (BNASIM) (i.e., PAHs) (40%) associated with soil and groundwater samples collected from AOC 5. Positive detections were qualified as "J" for indeterminant bias.
- In AOC 5, two groundwater FD samples were collected. One of the FD pairs exhibited an RPD greater than 30% for dissolved iron. All other analytes met the precision criteria. Eight soil FDs were collected from AOC 5. Some results for PAHs and metals did not meet the precision criteria (50% RPD). Soil is an inherently heterogeneous media; soil heterogeneity will be addressed during the RI by applying conservative screening approaches to the FD sample results.

Specific details pertaining to the Phase 1 RI precision information will be provided in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

6.2 ACCURACY

Accuracy is the closeness of a measured result to an accepted reference value and is usually measured as a percent recovery. QC analyses used to measure accuracy include LCSs, MSs, and surrogates. Upper and lower QC limits are provided in the UFP-QAPP (USACE, 2020b). The QC samples demonstrated that the

analytical system was in control during sample preparation and analysis (i.e., operating correctly), with the exceptions noted below.

- Several groundwater samples collected from AOC 4 clogged the solid phase extraction (SPE) cartridge (i.e., flow rate <4 milliliter [mL]/minute) during extraction. The extracted volume indicates that sufficient volume encountered the solid phase media to support sample analysis and avoid repreparation of the samples at a dilution. The sample limits of quantitation (LOQs) were adjusted accordingly and are discussed in **Section 6.6** (Sensitivity).
- Multiple groundwater samples exhibited surrogate recoveries that were less than the lower warning limits for DNCB, 2,4-DNP, and picric acid analysis in AOC 4.
    - The picric acid sample result for NYOW-04-WL080-A was recommended for rejection based on surrogate recovery less than 10%. The picric acid data set is sufficient to support the Phase 1 evaluation and the "X" qualified result does not affect the overall usability of the data set.
- Multiple groundwater samples exhibited surrogate recoveries that were greater than the upper control limit for picric acid analysis in AOC 4. All of the associated sample results were non-detect and not affected by positive bias.
- Multiple soil and groundwater samples exhibited surrogate recoveries less that the lower warning limits for SVOCs and BNASIM in AOC 5.
- Multiple LCS/LCSD and MS/MSD recoveries were greater than the upper warning limit for SVOCs and picric acid collected from AOC 4. The sample results were non-detect and not affected by positive bias.
- Multiple LCS/LCSD or MS/MSD recoveries were outside of warning limits for various VOCs, SVOCs, BNASIM and metals samples collected from AOC 5. The associated non-detect sample results were qualified as "UJ" and the associated positive detects were qualified as "J-" or "J+".
- Multiple soil MS/MSD recoveries for samples collected from AOC 4 were less than the lower control limit for picric acid and were qualified as "UJ".

Specific details pertaining to the Phase 1 RI accuracy information will be provided in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

6.3 REPRESENTATIVENESS

Representativeness qualitatively expresses the degree to which data accurately reflect Site conditions. Factors that affect the representativeness of analytical data include proper sample collection and preservation techniques, use of standard analytical methods, sampling design, and determination of matrix or analyte interferences.

Some soil samples collected from AOC 5 could not be thoroughly homogenized before sub-sampling and extraction for SVOC and BNASIM analyses were performed due to their clay matrix. Mixing of a strongly aggregated soil (e.g., clay) to reduce intra-sample variability is difficult due to the presence of cohesive clumps that require mechanical disaggregation. The resulting uncertainty was partially addressed by implementing a robust, biased soil sampling program targeted to potential source areas. The rationale supporting the number and type of samples for chemical analysis is described in the UFP-QAPP (USACE, 2020b).

Consistent with the laboratory SOP and Method 3535A, sample NYOW-04-WL005-A required vacuum filtration through glass fiber filter paper prior to analysis due to turbidity. The filtered sample was returned

to the original sample container after filtration and the surrogate was added to the container. Method 3535A indicates that use of a filter aid will not result in a loss of method performance if clogging is encountered; therefore, the representativeness of the temporary well sample was maintained.

Deviations from the sampling design are described in **Section 5.0**. Sampling design deviations included the relocation of several temporary wells due to refusal or to avoid a roadside drainage swale. The alternate well locations are consistent with the groundwater sampling objectives for the Site and do not adversely affect representativeness.

Additional details pertaining to the representativeness of the Phase 1 RI data will be provided in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

6.4 COMPLETENESS

Completeness is a measure of the amount of valid data obtained compared to the amount of data expected. Measurements are considered valid if they are unqualified or are qualified as estimated during data validation. Trace results, defined as results that are qualified as estimated because they fall between the detection limit (DL) and the LOQ, are not counted in the total number of qualified results summarized below. Analytical completeness is the percentage of usable data, which is defined as all non-rejected data. The analytical completeness was greater than 95% for both AOCs.

- All soil results from AOC 4 were determined to be usable for their intended purpose, as qualified. No results were recommended for rejection.
- The AOC 4 groundwater sample result for picric acid from location NYOW-04-WL080-A was recommended for rejection based on surrogate recovery. The impact of the rejected data point will be further evaluated in a separate document; however, it is noted that picric acid was not detected in any groundwater sample collected within AOC 4, including adjacent temporary wells NYOW-04-WL-036-A, NYOW-04-WL-081-A, and NYOW-04-WL-003-A. The direction of groundwater flow is toward NYOW-04-080 from west to east (NYOW-04-036 toward NYOW-04-080), indicating that upgradient locations are not impacted by picric acid.
- Three AOC 5 soil sample results for 2,2’-oxybis[1-chloropropane] were recommended for rejection based on the closing continuing calibration percent difference (NYOW-05-PH003-B, NYOW-05-SL002-A, and NYOW-05-SL003-A). One soil sample (NYOW-05-PH016-B) had results rejected for benzaldehyde, hexachloroethane, and 1,4-dioxane based on low LCS recoveries. The remaining soil sample results are usable for their intended purpose, as qualified.
- Results for base/neutral extractable (B/N) SVOCs associated with groundwater samples collected from AOC 5 temporary well locations NYOW-05-WL-024-A and NYOW-05-WL-010-A were recommended for rejection based on low surrogate recoveries. The B/N sample results from the ten remaining temporary wells were less than the PALs with the exception of 3,3’-dichlorobenzidine, discussed in **Section 6.6** (Sensitivity). 3,3’-Dichlorobenzidine was historically used in the production of dyes and pigments (National Center for Biotechnology Information [NCBI], 2021). The affected sample locations are within the Coal Storage Area and Coal Aggregate Bin where disposal of dyed material is unlikely to have occurred.
- Six of 12 temporary well groundwater sample results for 2,2’-oxybis[1-chloropropane] were recommended for rejection based on the closing continuing calibration percent difference. Usable groundwater results from the six remaining wells were non-detect with LOQs below the PAL. 2,2’-Oxybis[1-chloropropane] is highly water soluble and was primarily applied to surface soil as an

agricultural pesticide. Given that the AOC 5 soil sample results were non-detect, it is unlikely that 2,2'-oxybis[1-chloropropane] would be present in groundwater.

The completeness and sufficiency of the Phase 1 RI data will be further assessed in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

6.5 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to either past data from the current project or data from another study. It is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the approved plans are followed, and that proper sampling and analysis techniques are applied. Further, when assessing comparability, data sets should be of known and documented quality. The use of standardized sampling and analytical methods, units of reporting, and Site selection procedures help to ensure comparability. For the AOC 4 and AOC 5 sampling events, standard field sampling and typical laboratory protocols were used and are considered to have generated data with an acceptable level of comparability to background sampling or future investigative sampling events. Comparability will be further assessed in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

6.6 SENSITIVITY

Sensitivity refers to an instrument's or method's minimum concentration that can be reliably measured or reported, i.e., the LOQ. In order to meet the needs of data users, project data must meet the measurement performance criteria (MPC) for sensitivity and project LOQs specified in Worksheet #15 of the UFP-QAPP (USACE, 2020b). The laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes that were detected below the LOQ and above the DL were reported and qualified "J", as estimated values, by the laboratory.

- In AOC 4, all soil sample results were non-detect with LOQs greater than the PALs for 2,4-DNP and picric acid. The PALs for 2,4-DNP and picric acid are not attainable with contemporary analytical methodology; exceedances of these PALs were anticipated prior to sampling as documented in the UFP-QAPP (USACE, 2020b). Where LOQs exceed the PAL due to technical limitations, the project quantitation limit goal (PQLG) was set to the LOQ. The PAL for 2,4-DNCB was attained (600 micrograms per kilogram [µg/kg]) for all samples.
    - The PQLG for 2,4-DNP, established as the LOQ (1,700 µg/kg), was achieved for all soil samples indicating that project sensitivity objectives were met and the data are usable.
    - The PQLG for picric acid, established as the LOQ (250 µg/kg), was achieved for all soil samples indicating that project sensitivity objectives were met and the data are usable.
- In AOC 4, all groundwater sample results were non-detect with LOQs greater than the PALs for 2,4-DNP. A PAL has not been established for 2,4-DNCB.
    - The PQLG for 2,4-DNP, established as the LOQ (50 micrograms per liter [µg/L]), was achieved for all groundwater samples indicating that project sensitivity requirements were met and the data are usable.
    - The PQLG for picric acid (2 µg/L), established as 1/2 the PAL, was attained for 16 of 17 groundwater samples, indicating that project sensitivity objectives were substantially met and the data are usable. Sample NYOW-04-WL003-A was affected by turbidity and clogged the SPE cartridge.

- In AOC 5, all soil PQLGs for VOCs, SVOCs, and PCBs (Aroclors) were achieved. The LOQs for PAHs were less than the PQLG for non-detect sample results except for sample NYOW-05-SL024-A, which was analyzed at a 40X dilution due to the presence of analytes at concentrations greater than the linear range of the instrument calibration.
    - Three non-detect soil samples had LOQs slightly greater than the PQLG for mercury (0.017 milligrams per kilogram [mg/kg]). Eight non-detect soil samples had LOQs slightly greater than the PQLG for thallium (0.1 mg/kg). A total of 83 investigative and FD samples were collected from AOC 5; therefore, the project sensitivity objectives for soil were substantially met and the data are usable.
- In AOC 5, all aqueous PQLGs for non-detect VOCs and metals were met.
    - Three of 4 LOQs for Aroclor-1242 were slightly greater than the PQLG (1 µg/L), ranging from 1.1 µg/L to 1.3 µg/L.
    - Most LOQs for 3,3'-dichlorobenzidine were slightly greater than the PQLG (60 µg/L), ranging from 61 µg/L to 71 µg/L.
    - Several LOQs were slightly greater than PQLGs for benzo(a)anthracene and dibenz(a,h)anthracene (0.1 µg/L), ranging from 0.11 µg/L to 0.13 µg/L.
    - Given the marginal nature of these exceedances, the project sensitivity objectives for groundwater were substantially met and the data are usable.

Additional details pertaining to the sensitivity of the Phase 1 RI data and an evaluation of PQLGs will be provided in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

6.7 SUMMARY

Based on this preliminary assessment of DQIs for AOC 4 and AOC 5, the data obtained during the site investigations are of sufficient quantity and quality to support the Phase 1 evaluation of the nature and extent of contamination and human health and ecological risk screenings such that the conceptual site model (CSM) can be updated and data gaps identified. The data needs will continue to be assessed by the project team as findings are evaluated and the CSM evolves. This preliminary data usability assessment will be expanded in a separate and subsequent document, as discussed in **Section 1.0** and the beginning of **Section 6.0**.

7.0 REFERENCES

Bluestone. 2020. *Technical Memorandum – NYOW Site Visit*. Prepared for USACE CENAE. 20 October 2020.

DoD. 2019. *General Data Validation Guidelines*. U.S. Department of Defense, Environmental Data Quality Workgroup. https://denix.osd.mil/edqw/documents/documents/gen-data-validation-rev1/

DoD. 2020. *Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS*. U.S. Department of Defense, Environmental Data Quality Workgroup. https://denix.osd.mil/edqw/documents/documents/module-1/

EPA. 2003. *Ecological Soil Screening Level for Aluminum. Interim Final*. (OSWER Directive 9285.7-60). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_aluminum.pdf

EPA. 2003. *Ecological Soil Screening Level for Iron. Interim Final*. (OSWER Directive 9285.7-69). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_iron.pdf

EPA. 2005. *Ecological Soil Screening Level for Antimony. Interim Final*. (OSWER Directive 9285.7-61). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_antimony.pdf

EPA. 2005. *Ecological Soil Screening Level for Barium. Interim Final*. (OSWER Directive 9285.7-63). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_barium.pdf

EPA. 2005. *Ecological Soil Screening Level for Cadmium. Interim Final*. (OSWER Directive 9285.7-65). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_cadmium.pdf

EPA. 2005. *Ecological Soil Screening Level for Lead. Interim Final*. (OSWER Directive 9285.7-70). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_lead.pdf

EPA. 2005. *Ecological Soil Screening Level for Vanadium. Interim Final*. (OSWER Directive 9285.7-75). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_vanadium.pdf

EPA. 2006. *Ecological Soil Screening Level for Silver. Interim Final*. (OSWER Directive 9285.7-77). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_silver.pdf

EPA. 2007. *Ecological Soil Screening Level for Copper. Interim Final*. (OSWER Directive 9285.7-68). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_copper.pdf

EPA. 2007. *Ecological Soil Screening Level for Nickel. Interim Final. U.S. Environmental Protection Agency* (OSWER Directive 9285.7-76). U.S. Environmental Protection Agency, Office of

Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_nickel.pdf

EPA. 2007. *Ecological Soil Screening Level for Selenium. Interim Final*. (OSWER Directive 9285.7-72).U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_selenium.pdf

EPA. 2007. *Ecological Soil Screening Level for Zinc. Interim Final.* (OSWER Directive 9285.7-73). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_zinc.pdf

EPA. 2008. *Ecological Soil Screening Level for Chromium. Interim Final*. (OSWER Directive 9285.7-66). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_chromium.pdf

EPA. 2017a. *National Functional Guidelines for Organic Superfund Methods Data Review.* (EPA-540-R-2017-002). U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Information. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_organic_superfund_methods_data_review_013072017.pdf

EPA. 2017b. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* (EPA-540-R-2017-001). U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Information. https://www.epa.gov/sites/default/files/2017-01/documents/national_functional_guidelines_for_inorganic_superfund_methods_data_review_013002017.pdf

EPA. 2018. *Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites.* https://www.epa.gov/sites/default/files/2018-03/documents/era_regional_supplemental_guidance_report-march-2018_update.pdf

EPA. 2021. *May 2021 Resident Soil Regional Screening Levels* (Total Hazard Quotient = 0.1, Target Risk = 1E-06). https://semspub.epa.gov/work/HQ/400752.pdf

NCBI (National Center for Biotechnology Information). 2021. PubChem Compound Summary for CID 7070, 3,3'-Dichlorobenzidine. Retrieved August 20, 2021 from https://pubchem.ncbi.nlm.nih.gov/compound/3_3_-Dichlorobenzidine.

NYSDEC (New York State Department of Conservation). 2019. New York State Groundwater 703.5: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations – Groundwater Standards.

USACE. 2020a. *Accident Prevention Plan, Former New York Ordnance Works, Baldwinsville, New York, FUDS Property Number C02NY0290, Contract Number: W912WJ-19-D-0001, Delivery Order Number: W912WJ19F0056*. Prepared for USACE CENAE. Final. May 2020.

USACE. 2020b. *Uniform Federal Policy – Quality Assurance Project Plan, Former New York Ordnance Works, Baldwinsville, New York, FUDS Property Number C02NY0290, Contract No: W912WJ-19-D-0001, Task Order: W912WJ19F0056*. Prepared for USACE CENAE. Final. December 2020.

FIGURES

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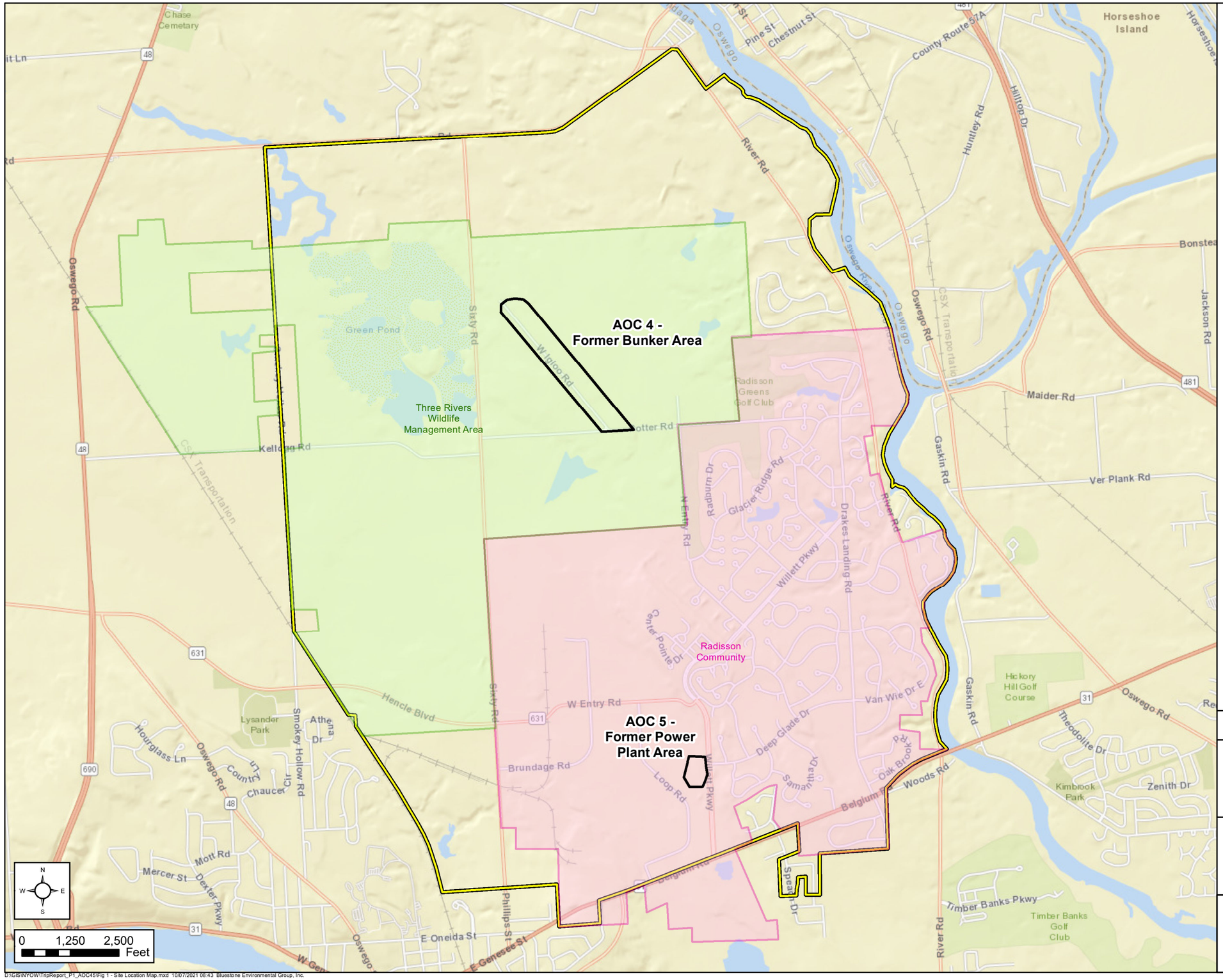

Legend

- Area of Concern 4 & 5 (approx.)
- Three Rivers Wildlife Management Area
- Radisson Community
- Former New York Ordnance Works

1. NYOW FUDS boundary provided by USACE.
2. Three Rivers WMA and Radisson Community boundaries are approximate.
3. Basemap: Esri World Street Map
4. Inset Basemap: Esri USA, Major Cities,USA States, and Counties

Figure 1

Site Location Map

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

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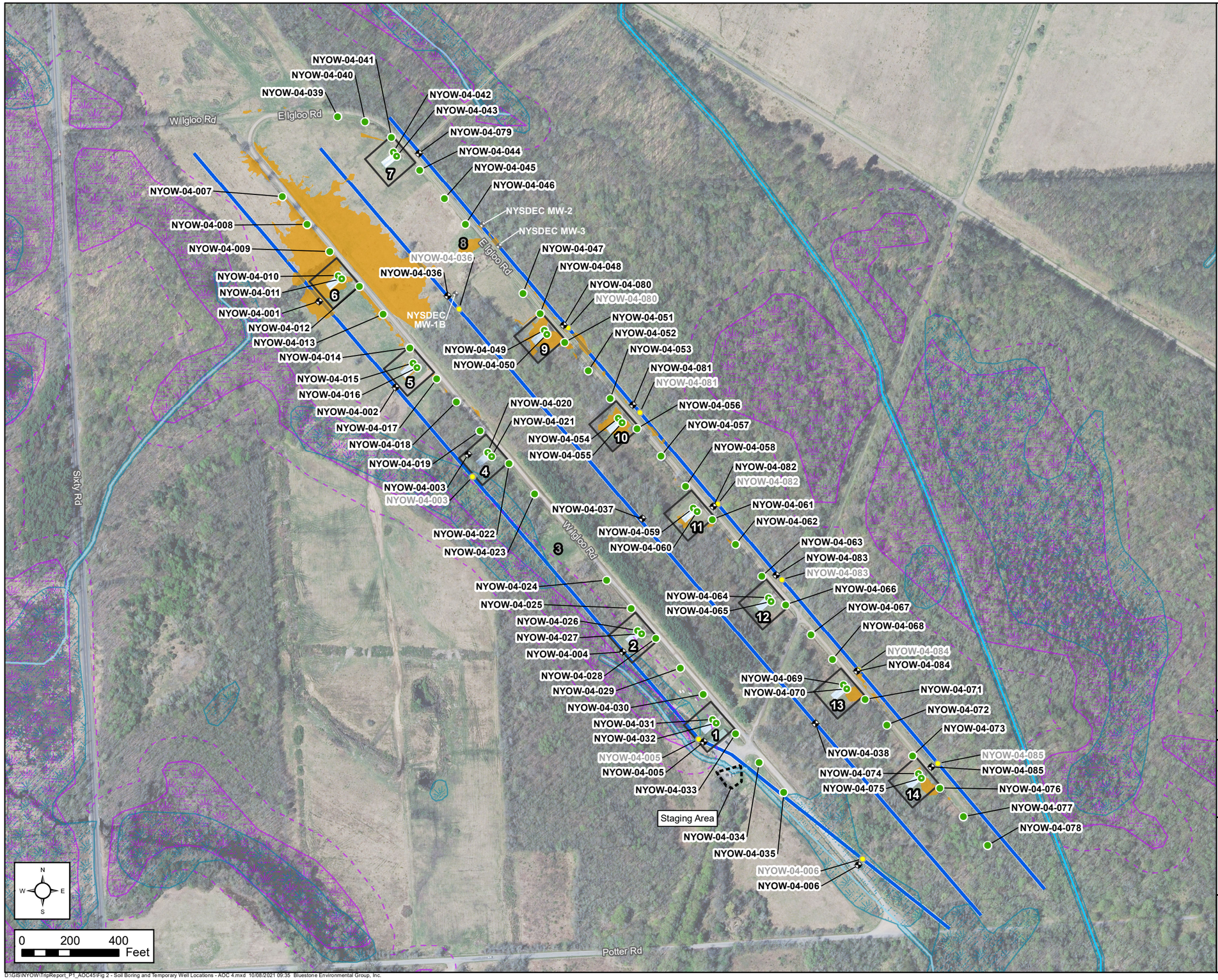

Legend

AOC 4 Sample Locations

- Temporary Well and Co-located Surface/Subsurface Soil
- Subsurface Soil at Outlet
- Subsurface Soil in Swale

Proposed Sample Locations (Later Relocated)

- Temporary Well and Co-located Surface/Subsurface Soil

Note: Proposed sample locations (labeled with gray text) are only shown where they differed from actual sample locations (labeled with black text).

- Existing Bunker Number / ISM Decision Unit
- Former Bunker Number
- Pre-Existing Monitoring Well (NYSDEC, 1990)
- DPT Transect
- Staging Area
- ISM Decision Unit (0.5 acre)
- Former Wastewater Ditch
- Stream
- USFWS NWI Wetland
- NYS Freshwater Wetland 100-ft Buffer
- NYS Freshwater Wetland
- Swallow-wort Locations as of Jan 2021

1. Pre-existing monitoring wells - NYSDEC, 1990
2. Former wastewater ditches - RFC, undated; Dames & Moore, 1981
3. NHD flowline - USGS, 2019
4. NWI wetlands - USFWS, 1981
5. NYS freshwater wetlands, Onondaga Co. - NYSDEC, 2010
6. Swallow-wort mapping provided by NYSDEC in Jan. 2021.
7. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

Figure 2

Soil Boring and Temporary Well Locations - AOC 4

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

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Legend

AOC 5 Sample Locations

- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Proposed Sample Locations (Later Relocated)

- Temporary Well and Co-located Surface/Subsurface Soil

Note: Proposed sample locations (labeled with gray text) are only shown where they differed from actual sample locations (labeled with black text).

- Area of Concern (approx.)

Historic Site Features

- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery.

Figure 3

Soil Boring and Temporary Well Locations - AOC 5

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

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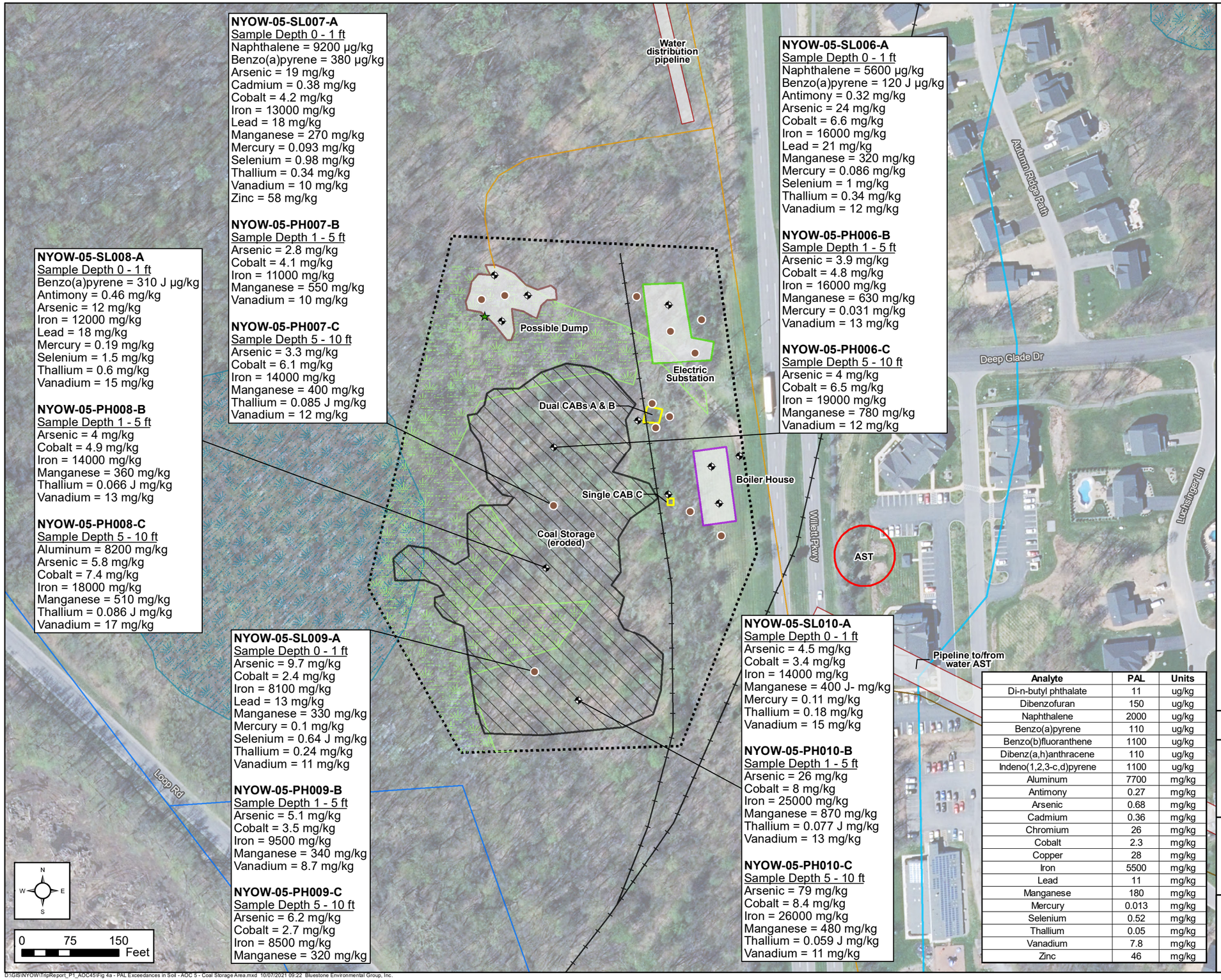


Legend

AOC 5 Sample Locations

- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Note:
- Samples were collected in January 2021.
- The sample depth is in feet below ground surface.
- Project Action Limit (PAL) exceedances are shown. See report tables for all detections.
- J = Estimated result

- Area of Concern (approx.)

Historic Site Features

- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

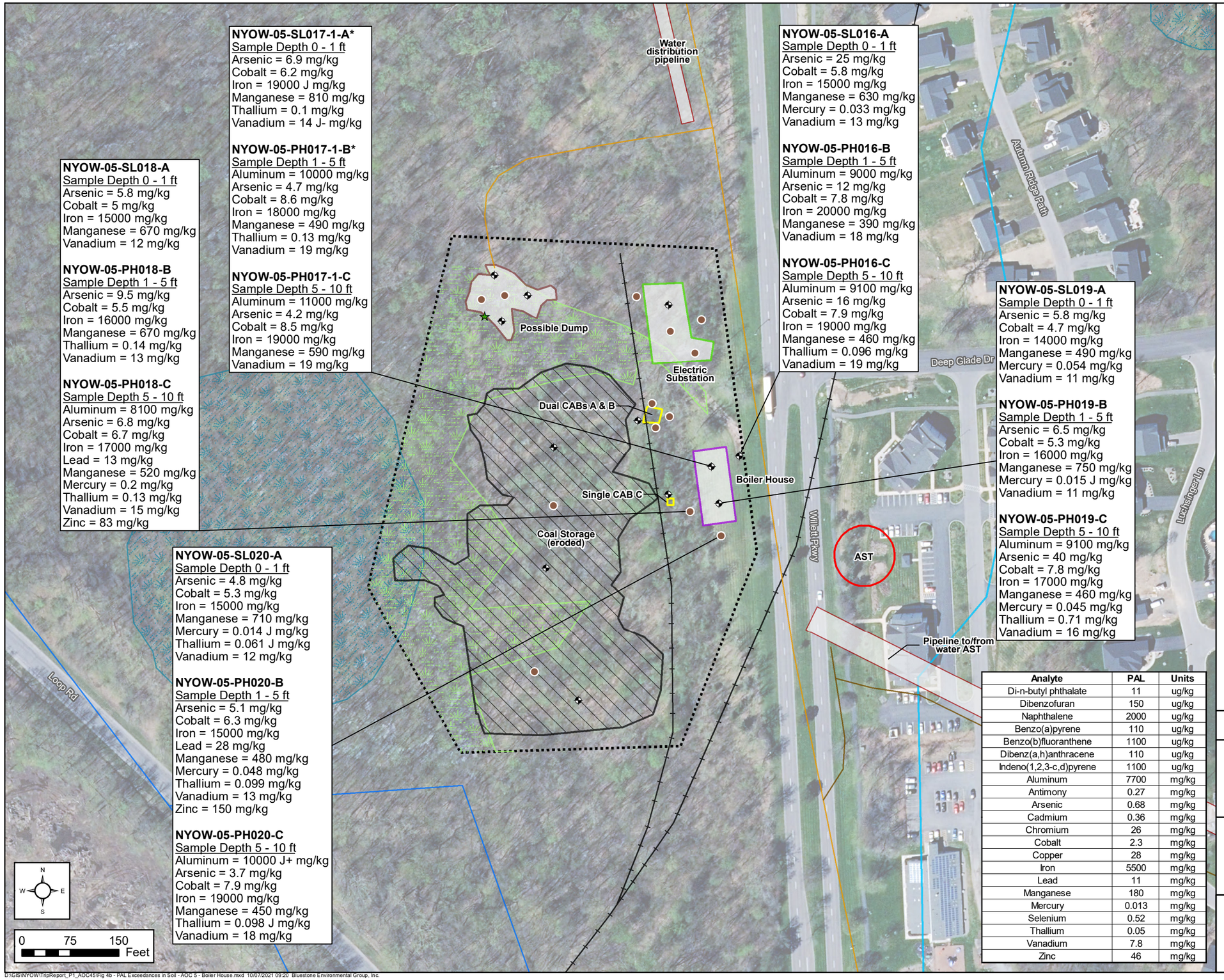
1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

Analyte	PAL	Units
Di-n-butyl phthalate	11	ug/kg
Dibenzofuran	150	ug/kg
Naphthalene	2000	ug/kg
Benzo(a)pyrene	110	ug/kg
Benzo(b)fluoranthene	1100	ug/kg
Dibenz(a,h)anthracene	110	ug/kg
Indeno(1,2,3-c,d)pyrene	1100	ug/kg
Aluminum	7700	mg/kg
Antimony	0.27	mg/kg
Arsenic	0.68	mg/kg
Cadmium	0.36	mg/kg
Chromium	26	mg/kg
Cobalt	2.3	mg/kg
Copper	28	mg/kg
Iron	5500	mg/kg
Lead	11	mg/kg
Manganese	180	mg/kg
Mercury	0.013	mg/kg
Selenium	0.52	mg/kg
Thallium	0.05	mg/kg
Vanadium	7.8	mg/kg
Zinc	46	mg/kg

Figure 4a

PAL Exceedances in Soil - AOC 5 - Coal Storage Area

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021



Legend

AOC 5 Sample Locations

- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Note:
- Samples were collected in January 2021.
- The sample depth is in feet below ground surface.
- Project Action Limit (PAL) exceedances are shown. See report tables for all detections.
- J = Estimated result

* Indicates a duplicate sample. The higher result of the parent and duplicate is shown.

- Area of Concern (approx.)

Historic Site Features

- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

Analyte	PAL	Units
Di-n-butyl phthalate	11	ug/kg
Dibenzofuran	150	ug/kg
Naphthalene	2000	ug/kg
Benzo(a)pyrene	110	ug/kg
Benzo(b)fluoranthene	1100	ug/kg
Dibenz(a,h)anthracene	110	ug/kg
Indeno(1,2,3-c,d)pyrene	1100	ug/kg
Aluminum	7700	mg/kg
Antimony	0.27	mg/kg
Arsenic	0.68	mg/kg
Cadmium	0.36	mg/kg
Chromium	26	mg/kg
Cobalt	2.3	mg/kg
Copper	28	mg/kg
Iron	5500	mg/kg
Lead	11	mg/kg
Manganese	180	mg/kg
Mercury	0.013	mg/kg
Selenium	0.52	mg/kg
Thallium	0.05	mg/kg
Vanadium	7.8	mg/kg
Zinc	46	mg/kg

Figure 4b

PAL Exceedances in Soil - AOC 5 - Boiler House

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

NYOW-05-SL011-A
Sample Depth 0 - 1 ft
Aluminum = 8200 mg/kg
Arsenic = 5.2 mg/kg
Cobalt = 7.1 mg/kg
Iron = 22000 mg/kg
Lead = 12 mg/kg
Manganese = 1100 mg/kg
Mercury = 0.085 mg/kg
Thallium = 0.12 mg/kg
Vanadium = 16 mg/kg

NYOW-05-PH011-B
Sample Depth 1 - 5 ft
Aluminum = 8900 J mg/kg
Arsenic = 4.4 mg/kg
Cobalt = 9.7 mg/kg
Iron = 19000 J mg/kg
Manganese = 760 mg/kg
Mercury = 0.03 mg/kg
Vanadium = 16 mg/kg

NYOW-05-PH011-C
Sample Depth 5 - 10 ft
Aluminum = 15000 mg/kg
Arsenic = 8.1 mg/kg
Cobalt = 10 mg/kg
Iron = 25000 mg/kg
Manganese = 470 mg/kg
Mercury = 0.016 J mg/kg
Thallium = 0.18 mg/kg
Vanadium = 28 mg/kg
Zinc = 50 mg/kg

NYOW-05-SL013-A
Sample Depth 0 - 1 ft
Arsenic = 4.3 mg/kg
Cobalt = 6.1 mg/kg
Iron = 17000 mg/kg
Manganese = 590 mg/kg
Mercury = 0.029 mg/kg
Vanadium = 14 mg/kg

NYOW-05-PH013-B
Sample Depth 1 - 5 ft
Arsenic = 5.5 mg/kg
Cadmium = 0.38 mg/kg
Cobalt = 5.9 mg/kg
Copper = 74 mg/kg
Iron = 19000 mg/kg
Manganese = 870 mg/kg
Mercury = 0.035 mg/kg
Vanadium = 13 mg/kg

NYOW-05-PH013-C*
Sample Depth 5 - 10 ft
Aluminum = 11000 mg/kg
Arsenic = 3.9 mg/kg
Cobalt = 9 mg/kg
Iron = 20000 mg/kg
Manganese = 510 mg/kg
Mercury = 0.014 J mg/kg
Vanadium = 20 mg/kg

NYOW-05-SL012-A
Sample Depth 0 - 1 ft
Arsenic = 5.9 mg/kg
Cobalt = 7 mg/kg
Iron = 21000 mg/kg
Lead = 24 mg/kg
Manganese = 1200 mg/kg
Mercury = 0.23 mg/kg
Thallium = 0.14 mg/kg
Vanadium = 15 mg/kg
Zinc = 49 mg/kg

NYOW-05-PH012-B
Sample Depth 1 - 5 ft
Aluminum = 18000 mg/kg
Arsenic = 5 mg/kg
Cobalt = 13 mg/kg
Iron = 27000 mg/kg
Manganese = 600 mg/kg
Mercury = 0.099 mg/kg
Thallium = 0.16 mg/kg
Vanadium = 31 mg/kg
Zinc = 56 mg/kg

NYOW-05-PH012-C
Sample Depth 5 - 10 ft
Aluminum = 17000 mg/kg
Arsenic = 4.1 mg/kg
Cobalt = 11 mg/kg
Iron = 26000 mg/kg
Manganese = 510 mg/kg
Mercury = 0.022 mg/kg
Thallium = 0.15 mg/kg
Vanadium = 32 mg/kg
Zinc = 55 mg/kg

NYOW-05-SL014-A
Sample Depth 0 - 1 ft
Arsenic = 4.9 mg/kg
Cobalt = 9.3 mg/kg
Iron = 18000 mg/kg
Lead = 13 mg/kg
Manganese = 660 mg/kg
Mercury = 0.026 mg/kg
Vanadium = 14 mg/kg

NYOW-05-PH014-B
Sample Depth 1 - 5 ft
Aluminum = 10000 mg/kg
Arsenic = 4.9 mg/kg
Cobalt = 6.2 mg/kg
Iron = 18000 mg/kg
Manganese = 330 mg/kg
Thallium = 0.096 mg/kg
Vanadium = 17 mg/kg

NYOW-05-PH014-C
Sample Depth 5 - 10 ft
Arsenic = 2.9 mg/kg
Cobalt = 7.3 mg/kg
Iron = 15000 mg/kg
Manganese = 460 mg/kg
Vanadium = 13 mg/kg

NYOW-05-SL015-A
Sample Depth 0 - 1 ft
Arsenic = 4.3 mg/kg
Cadmium = 0.39 mg/kg
Cobalt = 5.6 mg/kg
Iron = 15000 mg/kg
Manganese = 630 mg/kg
Mercury = 0.026 mg/kg
Vanadium = 12 mg/kg

NYOW-05-PH015-B
Sample Depth 1 - 5 ft
Arsenic = 4.8 mg/kg
Cobalt = 6.3 mg/kg
Iron = 16000 mg/kg
Manganese = 670 mg/kg
Mercury = 0.024 mg/kg
Vanadium = 14 mg/kg

NYOW-05-PH015-C
Sample Depth 5 - 10 ft
Arsenic = 8.6 mg/kg
Cobalt = 7.1 mg/kg
Iron = 16000 mg/kg
Manganese = 490 mg/kg
Mercury = 0.026 mg/kg
Vanadium = 14 mg/kg

Water distribution pipeline
Possible Dump
Electric Substation
Dual CABs A & B
Single CAB C
Coal Storage (eroded)
Boiler House
AST
Pipeline to/from water AST
Deep Glade Dr
Autumn Ridge Path
Willett Pkwy
Loop Rd
Lochsteger Ln

N
W E
S

0 75 150 Feet

Legend

AOC 5 Sample Locations
- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Note:
- Samples were collected in January 2021.
- The sample depth is in feet below ground surface.
- Project Action Limit (PAL) exceedances are shown. See report tables for all detections.
- J = Estimated result

* Indicates a duplicate sample. The higher result of the parent and duplicate is shown.

- Area of Concern (approx.)

Historic Site Features
- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

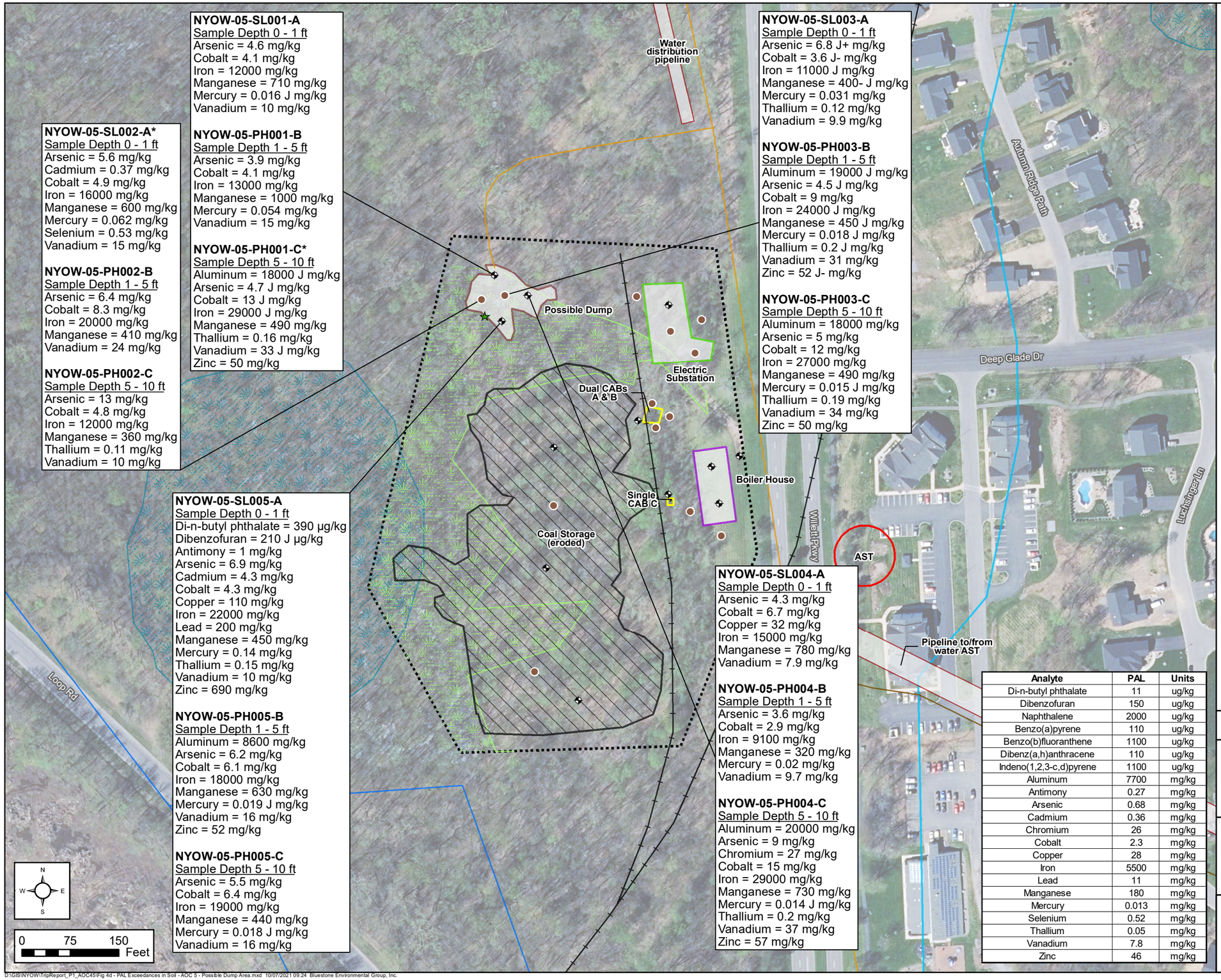
Analyte	PAL	Units
Di-n-butyl phthalate	11	ug/kg
Dibenzofuran	150	ug/kg
Naphthalene	2000	ug/kg
Benzo(a)pyrene	110	ug/kg
Benzo(b)fluoranthene	1100	ug/kg
Dibenz(a,h)anthracene	110	ug/kg
Indeno(1,2,3-c,d)pyrene	1100	ug/kg
Aluminum	7700	mg/kg
Antimony	0.27	mg/kg
Arsenic	0.68	mg/kg
Cadmium	0.36	mg/kg
Chromium	26	mg/kg
Cobalt	2.3	mg/kg
Copper	28	mg/kg
Iron	5500	mg/kg
Lead	11	mg/kg
Manganese	180	mg/kg
Mercury	0.013	mg/kg
Selenium	0.52	mg/kg
Thallium	0.05	mg/kg
Vanadium	7.8	mg/kg
Zinc	46	mg/kg

Figure 4c

PAL Exceedances in Soil - AOC 5 - Electric Substation

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

D:\GIS\NYOW\TripReport_P1_AOC45\Fig 4c - PAL Exceedances in Soil - AOC 5 - Electric Substation.mxd 10/07/2021 09:18 Bluestone Environmental Group, Inc.



Legend

AOC 5 Sample Locations

- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Note:
- Samples were collected in January 2021.
- The sample depth is in feet below ground surface.
- Project Action Limit (PAL) exceedances are shown. See report tables for all detections.
- J = Estimated result

* Indicates a duplicate sample. The higher result of the parent and duplicate is shown.

- Area of Concern (approx.)

Historic Site Features

- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

Analyte	PAL	Units
Di-n-butyl phthalate	11	ug/kg
Dibenzofuran	150	ug/kg
Naphthalene	2000	ug/kg
Benzo(a)pyrene	110	ug/kg
Benzo(b)fluoranthene	1100	ug/kg
Dibenz(a,h)anthracene	110	ug/kg
Indeno(1,2,3-c,d)pyrene	1100	ug/kg
Aluminum	7700	mg/kg
Antimony	0.27	mg/kg
Arsenic	0.68	mg/kg
Cadmium	0.36	mg/kg
Chromium	26	mg/kg
Cobalt	2.3	mg/kg
Copper	28	mg/kg
Iron	5500	mg/kg
Lead	11	mg/kg
Manganese	180	mg/kg
Mercury	0.013	mg/kg
Selenium	0.52	mg/kg
Thallium	0.05	mg/kg
Vanadium	7.8	mg/kg
Zinc	46	mg/kg

Figure 4d

PAL Exceedances in Soil - AOC 5 - Possible Dump Area

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

D:\GIS\NYOW\1\RIpReport_P1_AOC45\Fig 4d - PAL Exceedances in Soil - AOC 5 - Possible Dump Area.mxd 10/07/2021 09:24 Bluestone Environmental Group, Inc.

NYOW-05-SL021-A
Sample Depth 0 - 1 ft
Benzo(a)pyrene = 120 µg/kg
Arsenic = 10 mg/kg
Cobalt = 6.4 mg/kg
Iron = 17000 mg/kg
Lead = 21 mg/kg
Manganese = 650 mg/kg
Mercury = 0.11 mg/kg
Selenium = 0.9 mg/kg
Thallium = 0.18 mg/kg
Vanadium = 15 mg/kg
Zinc = 55 mg/kg

NYOW-05-PH021-B
Sample Depth 1 - 5 ft
Aluminum = 8800 J+ mg/kg
Arsenic = 7.4 mg/kg
Cobalt = 9 mg/kg
Copper = 34 mg/kg
Iron = 31000 mg/kg
Lead = 18 mg/kg
Manganese = 2400 mg/kg
Mercury = 0.084 mg/kg
Thallium = 0.12 mg/kg
Vanadium = 18 mg/kg
Zinc = 66 mg/kg

NYOW-05-PH021-C
Sample Depth 5 - 10 ft
Arsenic = 3.3 mg/kg
Cobalt = 6.3 mg/kg
Iron = 18000 mg/kg
Lead = 14 mg/kg
Manganese = 1100 J mg/kg
Thallium = 0.082 J mg/kg
Vanadium = 16 mg/kg

NYOW-05-SL022-A
Sample Depth 0 - 1 ft
Aluminum = 8000 J+ mg/kg
Arsenic = 5.4 mg/kg
Cobalt = 7.5 J- mg/kg
Iron = 21000 J mg/kg
Manganese = 660 J mg/kg
Mercury = 0.03 mg/kg
Vanadium = 17 mg/kg

NYOW-05-PH022-B*
Sample Depth 1 - 5 ft
Arsenic = 6.7 mg/kg
Cobalt = 5.8 mg/kg
Iron = 22000 mg/kg
Lead = 15 J mg/kg
Manganese = 1100 mg/kg
Mercury = 0.034 mg/kg
Vanadium = 14 mg/kg

NYOW-05-PH022-C
Sample Depth 5 - 10 ft
Arsenic = 5.8 mg/kg
Cobalt = 7.3 mg/kg
Iron = 16000 mg/kg
Manganese = 490 mg/kg
Vanadium = 14 mg/kg

NYOW-05-SL023-A*
Sample Depth 0 - 1 ft
Naphthalene = 2600 µg/kg
Benzo(a)pyrene = 880 µg/kg
Benzo(b)fluoranthene = 1500 µg/kg
Dibenz(a,h)anthracene = 950 µg/kg
Indeno(1,2,3-c,d)pyrene = 3500 µg/kg
Antimony = 0.33 mg/kg
Arsenic = 14 mg/kg
Cadmium = 0.38 mg/kg
Cobalt = 5.2 mg/kg
Iron = 14000 mg/kg
Lead = 17 mg/kg
Manganese = 450 mg/kg
Mercury = 0.085 mg/kg
Selenium = 0.73 mg/kg
Thallium = 0.25 mg/kg
Vanadium = 11 mg/kg
Zinc = 62 mg/kg

NYOW-05-PH023-B
Sample Depth 1 - 5 ft
Arsenic = 6.9 mg/kg
Cobalt = 6.3 mg/kg
Iron = 20000 mg/kg
Lead = 15 mg/kg
Manganese = 910 mg/kg
Mercury = 0.076 mg/kg
Vanadium = 15 mg/kg

NYOW-05-PH023-C
Sample Depth 5 - 10 ft
Arsenic = 3.5 mg/kg
Cobalt = 6.4 mg/kg
Iron = 16000 mg/kg
Manganese = 610 mg/kg
Vanadium = 13 mg/kg

NYOW-05-SL024-A
Sample Depth 0 - 1 ft
Naphthalene = 7100 µg/kg
Benzo(a)pyrene = 180 J µg/kg
Arsenic = 16 mg/kg
Iron = 11000 mg/kg
Mercury = 0.064 mg/kg
Selenium = 0.83 mg/kg
Thallium = 0.26 mg/kg

NYOW-05-PH024-B
Sample Depth 1 - 5 ft
Arsenic = 6.3 mg/kg
Cobalt = 6 mg/kg
Iron = 20000 mg/kg
Manganese = 820 mg/kg
Mercury = 0.033 mg/kg
Vanadium = 14 mg/kg

NYOW-05-PH024-C
Sample Depth 5 - 10 ft
Arsenic = 4.1 mg/kg
Cobalt = 5.4 mg/kg
Iron = 14000 mg/kg
Manganese = 480 mg/kg
Vanadium = 12 mg/kg

NYOW-05-SL025-A
Sample Depth 0 - 1 ft
Arsenic = 4.6 mg/kg
Cobalt = 5.2 J- mg/kg
Iron = 14000 mg/kg
Manganese = 410 J mg/kg
Mercury = 0.026 mg/kg
Thallium = 0.12 mg/kg
Vanadium = 13 mg/kg

NYOW-05-PH025-B
Sample Depth 1 - 5 ft
Aluminum = 9000 mg/kg
Arsenic = 5.4 mg/kg
Cobalt = 7.6 mg/kg
Iron = 24000 mg/kg
Manganese = 1100 mg/kg
Mercury = 0.051 mg/kg
Thallium = 0.11 mg/kg
Vanadium = 17 mg/kg

NYOW-05-PH025-C
Sample Depth 5 - 10 ft
Aluminum = 9000 mg/kg
Arsenic = 9.7 mg/kg
Cobalt = 7.5 mg/kg
Iron = 20000 mg/kg
Manganese = 480 mg/kg
Thallium = 0.1 mg/kg
Vanadium = 17 mg/kg

Water distribution pipeline
Possible Dump
Electric Substation
Dual CABs A & B
Boiler House
Single CAB C
Coal Storage (eroded)
AST
Pipeline to/from water AST
Deep Glade Dr
Willett Pkwy
Autumn Ridge Path
Ludwigsburger Ln
Loop Rd

N
W E
S

0 75 150
Feet

Analyte	PAL	Units
Di-n-butyl phthalate	11	ug/kg
Dibenzofuran	150	ug/kg
Naphthalene	2000	ug/kg
Benzo(a)pyrene	110	ug/kg
Benzo(b)fluoranthene	1100	ug/kg
Dibenz(a,h)anthracene	110	ug/kg
Indeno(1,2,3-c,d)pyrene	1100	ug/kg
Aluminum	7700	mg/kg
Antimony	0.27	mg/kg
Arsenic	0.68	mg/kg
Cadmium	0.36	mg/kg
Chromium	26	mg/kg
Cobalt	2.3	mg/kg
Copper	28	mg/kg
Iron	5500	mg/kg
Lead	11	mg/kg
Manganese	180	mg/kg
Mercury	0.013	mg/kg
Selenium	0.52	mg/kg
Thallium	0.05	mg/kg
Vanadium	7.8	mg/kg
Zinc	46	mg/kg

Legend

AOC 5 Sample Locations
- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Note:
- Samples were collected in January 2021.
- The sample depth is in feet below ground surface.
- Project Action Limit (PAL) exceedances are shown. See report tables for all detections.
- J = Estimated result

* Indicates a duplicate sample. The higher result of the parent and duplicate is shown.

- Area of Concern (approx.)

Historic Site Features
- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

Figure 4e

PAL Exceedances in Soil - AOC 5 - Coal Aggregate Bins

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

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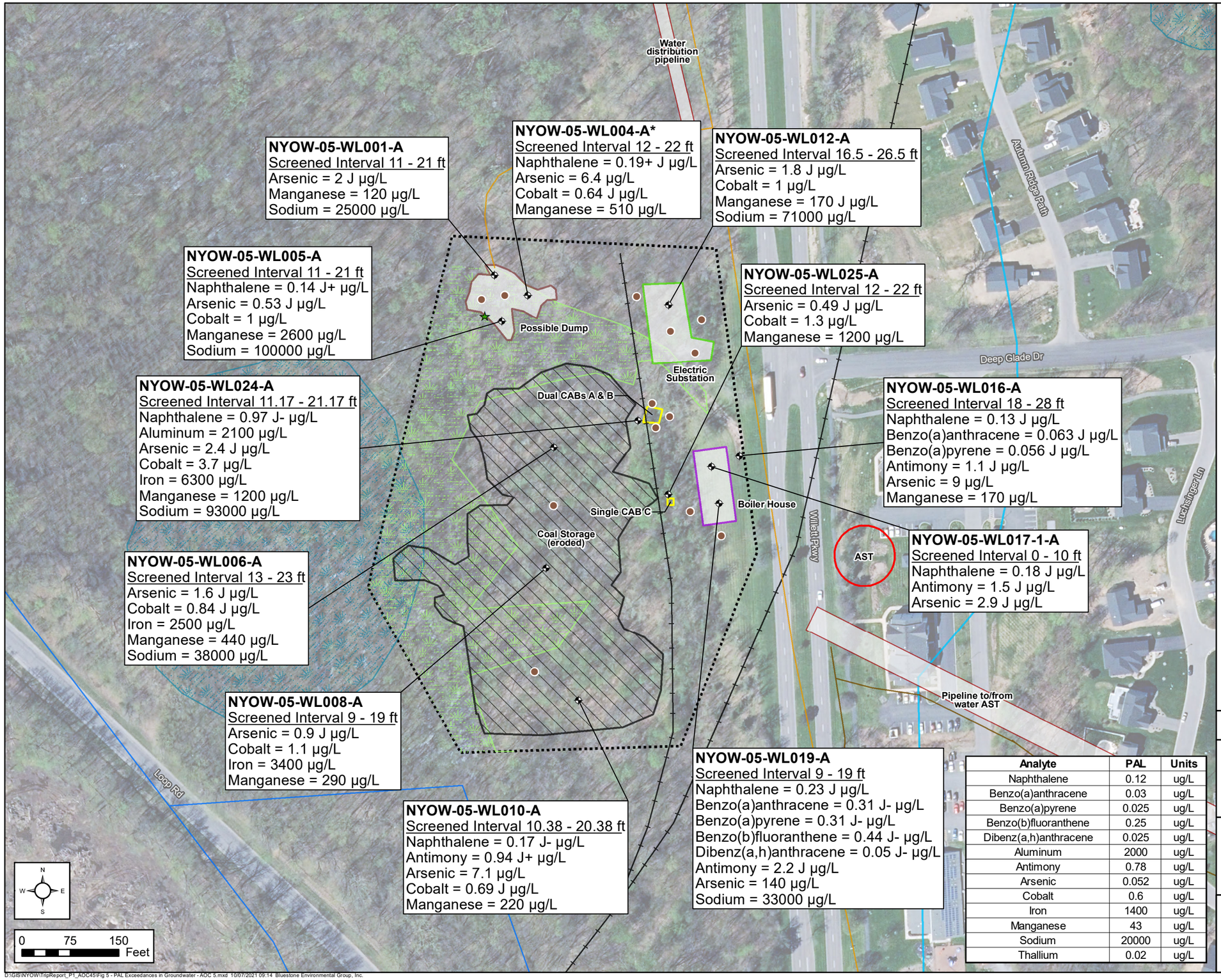

Analyte	PAL	Units
Naphthalene	0.12	ug/L
Benzo(a)anthracene	0.03	ug/L
Benzo(a)pyrene	0.025	ug/L
Benzo(b)fluoranthene	0.25	ug/L
Dibenz(a,h)anthracene	0.025	ug/L
Aluminum	2000	ug/L
Antimony	0.78	ug/L
Arsenic	0.052	ug/L
Cobalt	0.6	ug/L
Iron	1400	ug/L
Manganese	43	ug/L
Sodium	20000	ug/L
Thallium	0.02	ug/L

Legend

AOC 5 Sample Locations

- Temporary Well and Co-located Surface/Subsurface Soil
- Surface/Subsurface Soil

Note:
- Samples were collected in January 2021.
- The screened interval is in feet below ground surface.
- Project Action Limit (PAL) exceedances are shown. See report tables for all detections.
- J = Estimated result

* Indicates a duplicate sample. The higher result of the parent and duplicate is shown.

- Area of Concern (approx.)

Historic Site Features

- Drainage Ditch
- Railroad
- Road
- Road - Track
- Aboveground Storage Tank (AST)
- Coal Aggregate Bin (CAB)
- Coal Storage (Eroded)
- Boiler House
- Electric Substation
- Possible Dump
- Pipeline
- Candidate Vernal Pool (May 2020)
- Former Wastewater Ditch
- Wetland (May 2020)
- USFWS NWI Wetland

1. Historic site features provided by USACE in 2019.
2. Former wastewater ditch - RFC, undated; Dames & Moore, 1981
3. Wetland delineation - WRS, May 2020
4. NWI wetlands - USFWS, 1981
5. Basemap: NYS ITS GIS Program Office 2018 Orthoimagery

Figure 5

PAL Exceedances in Groundwater - AOC 5

Remedial Investigation Phase 1 Field Report
AOC 4 and AOC 5
Former New York Ordnance Works
Baldwinsville, New York
October 2021

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TABLES

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Table 1
Detected Results in Soil – AOC 5
Remedial Investigation Phase 1 Field Report – AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

Analyte	Unit	FOD	Detection Range	PAL	PAL Source	Exceed PAL?
Volatile Organic Compounds (VOCs)						
2-Butanone (MEK)	µg/kg	2/11	7.8 J – 8.6 J	1000	(d)	No
Acetone	µg/kg	1/11	69 – 69	1200	(d)	No
Benzene	µg/kg	1/11	0.48 J – 0.48 J	120	(d)	No
Toluene	µg/kg	1/11	0.58 J – 0.58 J	150	(d)	No
Semi-Volatile Organic Compounds (SVOCs)						
Benzaldehyde	µg/kg	1/71	63 J – 63 J	170000	(c)	No
Dibenzofuran	µg/kg	3/71	77 J – 210 J	150	(d)	**Yes**
Di-n-butyl phthalate	µg/kg	1/71	390 – 390	11	(d)	**Yes**
Polycyclic Aromatic Hydrocarbons (PAHs)						
1-Methylnaphthalene	µg/kg	39/83	0.82 J – 10000	18000	(c)	No
2-Methylnaphthalene	µg/kg	47/83	0.67 J – 14000	24000	(c)	No
Acenaphthene	µg/kg	8/83	1.7 J – 100 J	360000	(c)	No
Acenaphthylene	µg/kg	22/83	0.92 J – 380	NA	NA	NA
Anthracene	µg/kg	24/83	2 J – 290 J	1800000	(c)	No
Benzo(a)anthracene	µg/kg	47/83	2 J – 750	1100	(c)	No
Benzo(a)pyrene	µg/kg	45/83	1.7 J – 880	110	(c)	**Yes**
Benzo(b)fluoranthene	µg/kg	51/83	2.7 J- – 1500	1100	(c)	**Yes**
Benzo(g,h,i)perylene	µg/kg	37/83	2.3 J- – 4900	NA	NA	NA
Benzo(k)fluoranthene	µg/kg	34/83	2.3 J – 410	11000	(c)	No
Chrysene	µg/kg	57/83	2.3 J- – 1100	110000	(c)	No
Dibenz(a,h)anthracene	µg/kg	15/83	2.9 J – 950	110	(c)	**Yes**
Fluoranthene	µg/kg	52/83	2.4 J – 760	240000	(c)	No
Fluorene	µg/kg	21/83	1.3 J – 260 J	240000	(c)	No
Indeno(1,2,3-c,d)pyrene	µg/kg	37/83	2.5 – 3500	1100	(c)	**Yes**
Naphthalene	µg/kg	66/83	0.76 J- – 9200	2000	(c)	**Yes**
Phenanthrene	µg/kg	45/83	2.5 J – 5300	NA	NA	NA
Pyrene	µg/kg	53/83	2.3 J – 990	180000	(c)	No
Polychlorinated Biphenyls (PCBs - Aroclors)						
PCB-1260 (Aroclor 1260)	µg/kg	4/22	4.2 J – 160	240	(c)	No

Table 1
Detected Results in Soil – AOC 5
Remedial Investigation Phase 1 Field Report – AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

Analyte	Unit	FOD	Detection Range	PAL	PAL Source	Exceed PAL?
Metals						
Aluminum	mg/kg	83/83	1400 J+ – 20000	7700	(c)	**Yes**
Antimony	mg/kg	71/83	0.071 J – 1	0.27	(e)	**Yes**
Arsenic	mg/kg	83/83	1.5 J – 79	0.68	(c)	**Yes**
Barium	mg/kg	83/83	18 – 140	330	(e)	No
Beryllium	mg/kg	83/83	0.083 J – 0.83	16	(c)	No
Cadmium	mg/kg	83/83	0.015 J – 4.3	0.36	(e)	**Yes**
Calcium	mg/kg	83/83	2000 J+ – 120000 J	NA	NA	NA
Chromium	mg/kg	83/83	3.8 – 27	26	(e)	**Yes**
Cobalt	mg/kg	83/83	1.8 – 15	2.3	(c)	**Yes**
Copper	mg/kg	83/83	5.3 – 110	28	(e)	**Yes**
Iron	mg/kg	83/83	8100 – 31000	5500	(c)	**Yes**
Lead	mg/kg	83/83	2.4 – 200	11	(e)	**Yes**
Magnesium	mg/kg	83/83	620 – 28000	NA	NA	NA
Manganese	mg/kg	83/83	110 – 2400	180	(c)	**Yes**
Mercury	mg/kg	61/83	0.0075 J – 0.23	0.013	(d)	**Yes**
Nickel	mg/kg	83/83	4.9 – 32	38	(e)	No
Potassium	mg/kg	83/83	350 J – 4400	NA	NA	NA
Selenium	mg/kg	56/83	0.11 J – 1.5	0.52	(e)	**Yes**
Silver	mg/kg	1/83	0.27 J – 0.27 J	4.2	(e)	No
Sodium	mg/kg	36/83	37 J – 250 J	NA	NA	NA
Thallium	mg/kg	46/83	0.023 J – 0.71	0.05	(d)	**Yes**
Vanadium	mg/kg	83/83	5.9 – 37	7.8	(e)	**Yes**
Zinc	mg/kg	83/83	11 – 690	46	(e)	**Yes**

Notes: FOD = frequency of detection; J = estimated concentration (+/- indicates a high or low bias, respectively); mg/kg = milligram per kilogram; NA = not applicable; PAL = project action limit; µg/kg = microgram per kilogram

(a) See Appendix J for presentation of analytical results by sample.
(b) Results presented above do not combine primary and field duplicate (FD) samples.
(c) Environmental Protection Agency – May 2021 Resident Soil Regional Screening Levels (Total Hazard Quotient = 0.1, Target Risk = 1E-06)
(d) Environmental Protection Agency – 2018 Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites
(e) Environmental Protection Agency (various dates, see below) Ecological Soil Screening Levels
2003 – aluminum, iron; 2005 – antimony, barium, cadmium, lead, vanadium; 2006 – silver; 2007 – copper, nickel, selenium, zinc; and 2008 – chromium.

Table 2
Detected Results in Groundwater – AOC 5
Remedial Investigation Phase 1 Field Report – AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

Analyte	Unit	FOD	Detection Range	PAL	PAL Source	Exceed PAL?
Volatile Organic Compounds (VOCs)						
1,2,3-Trichlorobenzene	µg/L	1/4	0.45 J – 0.45 J	0.7	(c)	No
Semi-Volatile Organic Compounds (SVOCs)						
Caprolactam	µg/L	1/14	2.2 J- – 2.2 J-	990	(c)	No
Phenol	µg/L	1/14	2.5 J – 2.5 J	580	(c)	No
Polycyclic Aromatic Hydrocarbons (PAHs)						
1-Methylnaphthalene	µg/L	5/14	0.042 J – 0.63 J-	1.1	(c)	No
2-Methylnaphthalene	µg/L	5/14	0.085 J – 0.89 J-	3.6	(c)	No
Acenaphthene	µg/L	1/14	0.051 J- – 0.051 J-	53	(c)	No
Anthracene	µg/L	1/14	0.071 J- – 0.071 J-	180	(c)	No
Benzo(a)anthracene	µg/L	2/14	0.063 J – 0.31 J-	0.03	(c)	**Yes**
Benzo(a)pyrene	µg/L	2/14	0.056 J – 0.31 J-	0.025	(c)	**Yes**
Benzo(b)fluoranthene	µg/L	3/14	0.079 J – 0.44 J-	0.25	(c)	**Yes**
Benzo(g,h,i)perylene	µg/L	2/14	0.049 J – 0.17 J-	NA	NA	NA
Benzo(k)fluoranthene	µg/L	3/14	0.03 J – 0.22 J-	2.5	(c)	No
Chrysene	µg/L	4/14	0.051 J- – 0.35 J-	25	(c)	No
Dibenz(a,h)anthracene	µg/L	1/14	0.05 J- – 0.05 J-	0.025	(c)	**Yes**
Fluoranthene	µg/L	3/14	0.081 J – 0.6 J-	80	(c)	No
Indeno(1,2,3-c,d)pyrene	µg/L	2/14	0.045 J – 0.21 J-	0.25	(c)	No
Naphthalene	µg/L	11/14	0.039 J- – 0.97 J-	0.12	(c)	**Yes**
Phenanthrene	µg/L	6/14	0.057 J – 0.42 J-	NA	NA	NA
Pyrene	µg/L	3/14	0.072 J – 0.48 J-	12	(c)	No
Metals [(d)]						
Aluminum	µg/L	6/14	18 J – 2100	2000	(c)	**Yes**
Antimony	µg/L	4/14	0.94 J+ – 2.2 J	0.78	(c)	**Yes**
Arsenic	µg/L	14/14	0.49 J – 140	0.052	(c)	**Yes**
Barium	µg/L	14/14	23 – 210 J	380	(c)	No
Calcium	µg/L	14/14	25000 – 140000	NA	NA	NA
Chromium	µg/L	2/14	0.52 J – 12	2200	(c)	No
Cobalt	µg/L	14/14	0.14 J – 3.7	0.6	(c)	**Yes**
Copper	µg/L	1/14	6.5 J – 6.5 J	80	(c)	No
Iron	µg/L	10/14	100 – 6300	1400	(c)	**Yes**

Table 2
Detected Results in Groundwater – AOC 5
Remedial Investigation Phase 1 Field Report – AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

Analyte	Unit	FOD	Detection Range	PAL	PAL Source	Exceed PAL?
Lead	µg/L	1/14	1.4 J – 1.4 J	15	(c)	No
Magnesium	µg/L	14/14	2400 – 61000 J	NA	NA	NA
Manganese	µg/L	14/14	3.9 J – 2600	43	(c)	**Yes**
Nickel	µg/L	4/14	3.2 J – 16 J	39	(c)	No
Potassium	µg/L	14/14	2600 J – 12000 J	NA	NA	NA
Sodium	µg/L	14/14	15000 – 100000	20000	(d)	**Yes**
Vanadium	µg/L	2/14	3.8 J – 7.4 J	8.6	(c)	No
Zinc	µg/L	1/14	8.2 J – 8.2 J	600	(c)	No

Notes: FOD = frequency of detection; J = estimated concentration (+/- indicates a high or low bias, respectively); NA = not applicable; PAL = project action limit; µg/L = microgram per liter

(a) See Appendix J for presentation of analytical results by sample.
(b) Results presented above do not combine primary and field duplicate (FD) samples.
(c) Environmental Protection Agency – May 2021 Tapwater Regional Screening Levels (Total Hazard Quotient = 0.1, Target Risk = 1E-06)
(d) New York State Groundwater 703.5 - New York State Department of Environmental Conservation (NYSDEC; 6 NYCRR Part 703-5, 2019): Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations – Groundwater Standards
(e) Metals results represent dissolved or field filtered concentrations.

Table 3
Coal Ash Results Summary – AOC 5
Remedial Investigation Phase 1 Field Report – AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

Sample Name	Material Detected*
NYOW-05-SL010-A	Coal (very heavy)
NYOW-05-SL009-A	Coal (very heavy)
NYOW-05-SL008-A	Coal (very heavy)
NYOW-05-SL007-A	Coal (very heavy)
NYOW-05-SL006-A	Coal (heavy)
NYOW-05-SL024-A	Coal (very heavy), Coal Ash (moderate)
NYOW-05-SL023-A	Coal (heavy)
SL-DUP-001_210108 (NYOW-05-SL023-A Duplicate)	Coal (heavy)
NYOW-05-SL022-A	Coal Ash (trace)
NYOW-05-SL021-A	Coal (heavy)
NYOW-05-SL025-A	Coal (moderate)

*The concentrations of the particle types detected in each sample are listed in parenthesis in the table above and are based on the number of particles found and the relative difficulty in finding them based on the microscopic evaluation by MicroVision.

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APPENDICES

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APPENDIX A

Daily Safety Reports

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BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/04/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:45
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 36
TODAY'S HEALTH & SAFETY TOPIC:	Driving Safety - walk out wet areas before attempting to drive

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Patrick Joyce	
Keller Loughlin	
Vito Argese	
Jeff Schweitzer	
Joe Maule	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/05/21
CONTRACT NUMBER: W912WJ-19-D-0001,W912WJ19F0056
TIME: 09:00
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy with a 40% chance of snow, high of 36
TODAY'S HEALTH & SAFETY TOPIC:	Cutting - wear the appropriate PPE when handling chainsaws

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Jeff Schweitzer	
Jeremiah Leathersich	
Joe Maule	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/06/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 08:00
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Lysander, Onondaga County, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when a. applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 33
TODAY'S HEALTH & SAFETY TOPIC:	Physical Hazards - slips, trips, falls

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Mike Russett	
Jeff Schweitzer	
Jeremiah Leathersich	
Joshua Cook	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/07/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when a. applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 30
TODAY'S HEALTH & SAFETY TOPIC:	Cold Weather Stress - wear layers and take breaks as needed

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Jeremiah Leathersich	
Lisa Myers	
Tom Myers	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/08/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when a. applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 27
TODAY'S HEALTH & SAFETY TOPIC:	Rushing on a Friday - everyone on site should take their time

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Avery Wall	
Michael Belveg	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/11/21
CONTRACT NUMBER: W912WJ-19-D-0001
TIME: 07:30
CUSTOMER: USACE
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Lysander, Onondaga County, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when a. applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 37
TODAY'S HEALTH & SAFETY TOPIC:	Hand Injuries - Wear the appropriate PPE for the task

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Ethan Magee	
Jeff Schweitzer	
Corey Dillon	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/12/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 34
TODAY'S HEALTH & SAFETY TOPIC:	Slips, Trips, and Falls

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Ethan Magee	
Jeff Schweitzer	
Corey Dillon	
Olivia Beaulieu	
Michael Belveg	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/13/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 38
TODAY'S HEALTH & SAFETY TOPIC:	COVID-19 - masks and 6 ft distance

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Corey Dillon	
Olivia Beaulieu	
Robert Krause	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/14/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 41
TODAY'S HEALTH & SAFETY TOPIC:	Ergonomics - lift with your legs not your back

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Corey Dillon	
Olivia Beaulieu	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/15/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 09:05
CUSTOMER: USACE
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Syracuse NY, 13203
TODAY'S WEATHER FORECAST:	Partly sunny 35
TODAY'S HEALTH & SAFETY TOPIC:	Cold weather, Friday rush, equipment hazards

MEETING ATTENDEES

Print your name below.

Joe Maule	
Jeff Schweitzer	
Corey Dillon	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/22/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:40
CUSTOMER: USACE
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Snow 32
TODAY'S HEALTH & SAFETY TOPIC:	Cold weather and hunting safety

MEETING ATTENDEES

Print your name below.

Joe Maule	
Micheal Russett	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/25/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 08:00
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Partly Cloudy, high of 30
TODAY'S HEALTH & SAFETY TOPIC:	First day of drilling - wearing appropriate PPE

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/26/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:00
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy with snow in afternoon, high of 30
TODAY'S HEALTH & SAFETY TOPIC:	Snow - Slips, trips, falls and cold weather in the snow

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	
Mike Russett	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/27/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 26
TODAY'S HEALTH & SAFETY TOPIC:	Hand Injuries - Avoiding pinch points

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/28/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 18
TODAY'S HEALTH & SAFETY TOPIC:	Ergonomics - lifting and moving safely

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 01/29/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Snow, high of 16
TODAY'S HEALTH & SAFETY TOPIC:	Fridays - rushing and trying to move too quickly

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 02/01/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Snow, high of 30
TODAY'S HEALTH & SAFETY TOPIC:	Snow - wet and slippery conditions

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	
Joshua Cook	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 02/02/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Snow, high of 30
TODAY'S HEALTH & SAFETY TOPIC:	Driving Safety - drive slow and walk areas with snow first

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	
Avery Wall	
Zane Presler	
Mike Russet	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 02/03/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Snow, high of 31
TODAY'S HEALTH & SAFETY TOPIC:	Slips, trips, and falls - long walks in the snow

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 02/04/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 36
TODAY'S HEALTH & SAFETY TOPIC:	Ergonomics - lift with legs not back

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

BLUESTONE ENVIRONMENTAL GROUP
TAILGATE HEALTH & SAFETY MEETING

PROJECT NAME: Former New York Ordnance Works
DATE: 02/05/21
CONTRACT NUMBER: W912WJ-19-D-0001, W912WJ19F0056
TIME: 07:30
CUSTOMER: USACE New England District
REPORT NO: n/a
SPECIFIC LOCATION: 6,795 acres in Baldwinsville, New York
TYPE OF WORK: Land/Utility Clearing, Discrete Soil Sampling, ISM Surface Soil Sampling, GW Sampling
CHEMICALS USED: Methanol, Nitric Acid, Liquinox

HEALTH & SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT:	Modified Level-D (high visibility, nitrile gloves, Leather gloves when applicable, safety glasses, steel toe boots) and COVID-19 masks.
SITE-SPECIFIC CHEMICAL HAZARDS:	AOCs 1,3, and 5 - Metals, SVOCs, 1,1-Biphenyl, PAHs; AOC 4 - DNCB, 2,4-DNP, and Picric Acid
SITE-SPECIFIC PHYSICAL HAZARDS:	Hunters, Biologic Hazards, Slips, Trips, Falls
SITE EMERGENCY PROCEDURES:	Call 911, Meet at the AOC 4 staging area
EMERGENCY TELEPHONE NUMBERS:	911
NEAREST HOSPITAL TO THE SITE:	St. Joseph's Hospital Health Center - 301 Prospect Ave. Svracuse NY. 13203
TODAY'S WEATHER FORECAST:	Cloudy, high of 40
TODAY'S HEALTH & SAFETY TOPIC:	Last Day on Site - avoid rushing

MEETING ATTENDEES

Print your name below.

Skylar Georgius	
Joe Maule	
Jeff Schweitzer	
Andrew Hudson	

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APPENDIX B
Daily Quality Control Reports

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Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/4/2021

Report No:	1	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	Moderate	High	Direction: 5 mph NE	
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Today's activities included flagging all proposed sampling locations, conducting a drilling site walk, and setting up the staging area. Jeff Schweitzer (Nothnagle Drilling) completed a site walk to confirm land clearing and drilling plans. Fencing contractors arrived on site at 9:00 to install fencing around the staging area. The fencing was secured with a Bluestone lock. Porta-John contractors arrived around 10:35 and placed the toilet into the fenced staging area.	Y

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	13:00	14:00	Y	N
Skylar Georgius	Bluestone	7:45	13:00	Y	N
Patrick Joyce	Atlas Fence	9:00	10:30	Y	Y; setting up staging area fencing
Keller Loughlin	Atlas Fence	9:00	10:30	Y	Y; setting up staging area fencing
Vito Argese	Methieson Portable Toilets	10:35	10:50	Y	Y; dropping off Porta-John
Jeff Schweitzer	Nothnagle Drilling	10:45	12:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Driving Safety	Walk out wet areas before attempting to drive			
Site Specific Hazards	Hunters, Biologic Hazards, Slips, Trips, Falls			
Level:	D	C	B	A

Samples

COMMENTS: The staging area was moved from AOC 5 to AOC 4 based on the newly signed ROE.

Planned activities for next day: Land clearing using a brush hog and chainsaws will begin tomorrow. Nothnagle anticipates two days of land clearing upon conducting the site walk.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/5/2021

Report No:	2	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 5 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Land clearing activities began today. Nothnagle used a skid steer, machete, and chainsaw to clear paths to the sampling locations. Chaps, face shields, hard hats, hearing and eye protection were all used during these activities. Sampling locations around the two coal aggregate bin locations, the electric sub-station, and the transect through the center of the coal storage area have been cleared. Land clearing will be completed tomorrow.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	16:00	16:30	Y	N
Skylar Georgius	Bluestone	8:30	16:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	9:00	15:45	Y	N
Jeremiah Leathersich	Nothnagle Drilling	9:00	15:45	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Cutting	Wear the appropriate PPE when handling chainsaws			
Physical Hazards	Hunters, Biologic Hazards, Slips, Trips, Falls			
Level:	D	C	B	A

Samples

COMMENTS: It rained and snowed throughout the day. The snow did not impede progress.

Planned activities for next day: Land clearing activities will continue around the possible dumping area tomorrow. Utility clearing will occur tomorrow.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/6/2021

Report No:	3	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 8 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
The utility locator arrived on site at 7:50 and began clearing all locations. All AOC 5 locations were cleared today. The drillers arrived on site at 10:00 with the drill rig. They set up the rig at AOC 5 and spent the day clearing at the possible dump. Bluestone also constructed the decontamination pad at the staging area today. Joshua Cook stopped by to do a site visit at 9:42.	Y

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	8:00	15:00	Y	N
Skylar Georgius	Bluestone	7:30	15:00	Y	N
Jeff Schweitzer	Nothnagle Drilling	9:10	12:30	Y	N
Jeremiah Leathersich	Nothnagle Drilling	9:10	12:30	Y	N
Mike Russett	GPRS	7:50	9:30	Y	Y; Utility Locate
Joshua Cook	NY DEC	9:42	11:45	Y	Y; Stakeholder Site Visit

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Physical Hazards	Slips, Trips, Falls			
Level:	D	C	B	A

Samples

COMMENTS: The GPR was unable to be moved back to the transect along the coal storage area or the possible dump due to the wet terrain. The EM locator was used at all locations. Cleared pathways with chainsaw in dump for geophysical survey to minimize surface disturbance. Josh Cook agreed to this approach.

Planned activities for next day: Drilling and sampling at AOC 5 will begin tomorrow.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/7/2021

Report No:	4	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 5 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Sampling began along the coal storage area transect today. Surface and subsurface soil samples were collected from NYOW-05-007, NYOW-05-008, NYOW-05-009, and NYOW-05-010. Groundwater samples were not collected today.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	16:30	Y	N
Skylar Georgius	Bluestone	7:30	16:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	16:00	Y	N
Jeremiah Leathersich	Nothnagle Drilling	7:30	16:00	Y	N
Lisa Myers	Bluestone	12:45	14:00	Y	Y; Bluestone President site visit
Tom Myers	Bluestone	12:45	14:00	Y	Y; Bluestone Vice President site visit

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Cold Weather Stress	wear layers and take breaks as needed			
Level:	D	C	B	A

Samples

Sample ID	Analysis
NYOW-05-SL007-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH007-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH007-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL008-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH008-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH008-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL009-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH009-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH009-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL010-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH010-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH010-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
PH-DUP-001_210107	6010C, 6020A, 7471B, 8270D, 8270D SIM
EB-01_210107	6010C, 6020A, 7471B, 8270D, 8270D SIM

COMMENTS: Lisa Myers and Tom Myers visited AOC 5 to check on the progress of sampling.

Planned activities for next day: Sampling will continue at the coal storage area and coal aggregate bins tomorrow.

Preparer Joe Maule

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/8/2021

Report No:	5	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 5 mph S		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Sampling of surface and subsurface soils along the coal storage area transect finished today. Groundwater samples will be taken next week. Sampling at the coal aggregate bins began today. Surface and subsurface soil samples were collected from NYOW-05-006, NYOW-05-020, NYOW-05-021, NYOW-05-022, NYOW-05-023, and NYOW-05-024.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	16:30	Y	N
Skylar Georgius	Bluestone	7:30	16:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	16:30	Y	N
Avery Wall	Nothnagle Drilling	7:30	16:30	Y	N
Michael Belveg	NY DEC	9:45	10:45	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Rushing on a Friday	It's the end of the work week but everyone on site should take their time on tasks to not introduce more risk			
Physical Hazards	Hunters, Biologic Hazards, Slips, Trips, Falls			
Level:	D	C	B	A

Samples

NYOW-05-SL020-A	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH020-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH020-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL021-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH021-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH021-C (MS/MSD)	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL022-A (MS/MSD)	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH022-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH022-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL023-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH023-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH023-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL024-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
NYOW-05-PH024-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH024-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL006-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH006-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH006-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
SL-DUP-001_210108 (associated with NYOW-05-SL023-A)	6010C, 6020A, 7471B, 8270D SIM, Coal Ash
PH-DUP-001_210108 (associated with NYOW-05-PH022-B)	6010C, 6020A, 7471B, 8270D, 8270D SIM
EB-01_210108	6010C, 6020A, 7471B, 8270D, 8270D SIM

COMMENTS: Avery Wall is the new drilling helper on site. We reviewed the APP and HASP before starting work. Michael Belveg visited the site for an hour this morning.

Planned activities for next day: Soil sampling at the coal aggregate bins will continue on Monday. Sampling at the possible dump will begin.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/9/2021

Report No:	6	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 5 mph S		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Collected water level measurements from temporary well points installed on 1/7 and 1/8/21.	Y

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	13:00	13:45	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Wind Chill	Wind can lower temperatures making the air feel colder			
Physical Hazards	Hunters, Biologic Hazards, Slips, Trips, Falls			
Level:	D	C	B	A

Samples

COMMENTS: Well Measurements as follows:
NYOW-05-006: DTW = 5.85 ft btoc; DOW = 24.09 ft btoc; stick-up = 1.12 ft ags
NYOW-05-008: DTW = 1.95 ft btoc; DOW = 20.18 ft btoc; stick-up = 1.05 ft ags
NYOW-05-010: DTW = 1.71 ft btoc; DOW = 13.05 ft btoc; stick-up = 1.13 ft ags
NYOW-05-024: DTW = 8.48 ft btoc; DOW = 21.17 ft btoc; stick-up = 1.12 ft ags

Planned activities for next day: Soil sampling at the coal aggregate bins will continue on Monday. Sampling at the possible dump will begin.

Preparer Joe Maule

DAILY QUALITY CONTROL REPORT

Prepared by: Skylar Georgius
Date: 1/11/2021

Report No:	7	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 5 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Groundwater sampling along the coal storage area transect and coal aggregate bins began today. Groundwater samples were taken from NYOW-05-006, NYOW-05-008, and NYOW-05-024. Surface and subsurface soil samples were collected from NYOW-05-018, NYOW-05-019, and NYOW-05-025. The temporary well previously installed at NYOW-05-010 was replaced with a deeper temporary well to ensure samples are collected from the true groundwater table, as opposed to perched groundwater observed in the area.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Ethan Magee	Bluestone	7:30	16:30	Y	N
Skylar Georgius	Bluestone	7:30	16:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	16:30	Y	N
Corey Dillon	Nothnagle Drilling	7:30	16:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Hand Injuries	Wear the appropriate PPE for the task and use the right tools for the job			
Physical Hazards	Hunters, Biologic Hazards, Slips, Trips, Falls			
Level:	D	C	B	A

Samples	
NYOW-05-SL018-A	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH018-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH018-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL019-A	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH019-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH019-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-WL006-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
NYOW-05-WL008-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
NYOW-05-WL024-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
NYOW-05-SL025-A	6010C, 6020A, 7471B, 8270D SIM, Coal Ash, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH025-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH025-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
EB-01_210111 (aqueous)	6010C, 6020A, 7470A, 8270D, 8270D SIM
EB-02_210111 (soils)	6010C, 6020A, 7470A, 8270D, 8270D SIM

COMMENTS: Ethan Magee is the new Bluestone PG helping on site. Corey Dillon is the new drilling helper on site. We reviewed the APP and HASP before starting work due to two new people on site. All coal ash soil samples were shipped to MicroVision labs today.

Planned activities for next day: Sampling at the possible dump will begin.

Preparer Skylar Georgius

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Skylar Georgius
Date: 1/12/2021

Report No:	8	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 8 mph E		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Groundwater sampling along the coal storage area transect and coal aggregate bins continued today. Groundwater samples were collected from NYOW-05-010 and NYOW-05-025. Surface and subsurface soil samples were collected from the possible dump area today. Surface and subsurface soil samples were collected from NYOW-05-001, NYOW-05-002, NYOW-05-003, NYOW-05-004, and NYOW-05-005.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Ethan Magee	Bluestone	7:30	17:30	Y	N
Skylar Georgius	Bluestone	7:30	17:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	16:00	Y	N
Corey Dillon	Nothnagle Drilling	7:30	16:00	Y	N
Olivia Beaulieu	USACE NewEngland	7:30	16:00	Y	Y; USACE oversight
Michael Belveg	NYSDEC	9:30	11:00	Y	Y; DEC site visit

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Slips, Trips, Falls	Do not carry too much equipment. You should be able to see your feet when you walk.			
Level:	D	C	B	A

Samples	
NYOW-05-WL010-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
SL-DUP-001_210112 (NYOW-05-SL002-A)	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
PH-DUP-001_210112 (NYOW-05-PH001-C)	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-WL025-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
NYOW-05-SL005-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH005-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-PH005-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-SL001-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH001-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-PH001-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-SL002-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH002-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-PH002-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-SL003-A (MS/MSD)	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH003-B (MS/MSD)	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH003-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-SL004-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH004-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-PH004-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8260C, 8082A
EB-01_210112 (soils)	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A
EB-02_210112 (aqueous)	6010C, 6020A, 7470A, 8270D, 8270D SIM
TB-01_210112	8260C

COMMENTS: Olivia Beaulieu arrived on site today to observe the field work.

Planned activities for next day: The geophysical survey at the possible dump area will begin tomorrow.

Preparer Skylar Georgius

DAILY QUALITY CONTROL REPORT

Prepared by:	Skylar Georgius
Date:	1/13/2021
Report No:	9
Project No:	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works
Location of Work:	Baldwinsville, New York

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 5 mph NE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
A groundwater sample was collected from NYOW-05-001. Surface and subsurface soil samples were collected from the substation area today. Surface and subsurface soil samples were collected from NYOW-05-011, NYOW-05-012, NYOW-05-013, NYOW-05-014, and NYOW-05-015. The geophysical survey in the possible landfill was completed today.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	17:30	Y	N
Skylar Georgius	Bluestone	7:30	17:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	16:00	Y	N
Corey Dillon	Nothnagle Drilling	7:30	16:00	Y	N
Olivia Beaulieu	USACE	7:30	16:00	Y	Y; USACE oversight
Robert Krause	Rettew (Geophysics)	8:00	13:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
COVID-19	Wear masks, stay 6 ft apart, use hand sanitizer and decon shared equipment			
Level:	D	C	B	A

Samples	
NYOW-05-WL001-A (MS/MSD)	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A
PH-DUP-001_210113 (NYOW-05-PH013-C)	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL011-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH011-B (MS/MSD)	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH011-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL012-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH012-B	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH012-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-SL013-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH013-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH013-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL014-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH014-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH014-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL015-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 8082A
NYOW-05-PH015-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH015-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
EB-01_210113 (soils)	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8082A
TB-01_210113	8260C
EB-02_210113 (aqueous)	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A

COMMENTS: Robert Krause was on site today to complete the geophysical field work. NYOW-05-015 hit refusal at 25.5' bgs. No saturated zone was observed. A well was not installed at this location. A well will be installed at NYOW-05-016 instead.

Planned activities for next day: Sampling with the DPT rig will finish tomorrow.

Preparer Skylar Georgius

DAILY QUALITY CONTROL REPORT

Prepared by:	Skylar Georgius
Date:	1/14/2021
Report No:	10
Project No:	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works
Location of Work:	Baldwinsville, New York

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 4 mph NE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Groundwater samples were collected from NYOW-05-004, NYOW-05-005, and NYOW-05-012. Surface and subsurface soil samples were collected from the remaining two sampling locations at the boiler house: NYOW-05-016 and NYOW-05-017-1. A temporary well was installed at NYOW-05-017-1, which is an offset locaton due to shallow refusal at NYOW-05-017. The drillers were unable to complete the temporary well at NYOW-05-016 today; well construction will be completed tomorrow.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	17:30	Y	N
Skylar Georgius	Bluestone	7:30	17:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	16:00	Y	N
Corey Dillon	Nothnagle Drilling	7:30	16:00	Y	N
Olivia Beaulieu	USACE New England	7:30	16:00	Y	Y; USACE oversight

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Ergonomics	Lift with your legs not your back			
Level:	D	C	B	A

Samples	
NYOW-05-WL004-A	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-WL012-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
PH-DUP-001_210114 (NYOW-05-PH017-1-B)	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-WL005-A	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A
NYOW-05-SL017-1-A	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH017-1-B	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-PH017-1-C	6010C, 6020A, 7471B, 8270D, 8270D SIM
NYOW-05-SL016-A	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH016-B	6010C, 6020A, 7471B, 8270D, 8270D SIM,9060A, ASTM D422 w/ hydrometer, 9081/6010B
NYOW-05-PH016-C	6010C, 6020A, 7471B, 8270D, 8270D SIM, 9060A, ASTM D422 w/ hydrometer, 9081/6010B
SL-DUP-001_210114 (NYOW-05-SL017-1-A)	6010C, 6020A, 7471B, 8270D, 8270D SIM
WL-DUP-001_210114 (NYOW-05-WL004-A)	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A
WL-DUP-002_210114 (NYOW-05-WL012-A)	6010C, 6020A, 7470A, 8270D, 8270D SIM
EB-01_210114 (soils)	6010C, 6020A, 7470A, 8270D, 8270D SIM
TB-01_210114	8260C
EB-02_210114 (aqueous)	6010C, 6020A, 7470A, 8270D, 8270D SIM, 8260C, 8082A

COMMENTS: A well will be installed at NYOW-05-016 instead of at NYOW-5-015 as originally planned. NYOW-05-017 hit shallow refusal. The point was offset and renamed NYOW-05-017-1.

Planned activities for next day: Sampling of the remaining three temporary groundwater wells will wrap up tomorrow as well as the install of a temporary well at NYOW-05-016.

Preparer Skylar Georgius

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/15/2021

Report No:	11	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 4 mph NE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Groundwater samples were collected from NYOW-05-016, NYOW-05-017-1, and NYOW-05-019, completing the groundwater sampling at AOC 5. The temporary well was installed at NYOW-05-016 to 28 ft bgs.	Y

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	8:00	16:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	9:00	13:30	Y	N
Corey Dillon	Nothnagle Drilling	9:00	13:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Cold weather, Friday rush, equipment hazards	Be extra aware of rushing to complete tasks on a Friday around moving equipment and in cold weather			
Level:	D	C	B	A

Samples

NYOW-05-WL016-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
NYOW-05-WL017-1-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
NYOW-05-WL019-A	6010C, 6020A, 7470A, 8270D, 8270D SIM
EB-01_210115 (aqueous)	6010C, 6020A, 7470A, 8270D, 8270D SIM

COMMENTS: All temporary wells at AOC 5 were installed and groundwater sampling was completed today. This completes the soil and groundwater sampling at AOC 5.

Planned activities for next day: Synoptic groundwater levels at AOC 5. Monitoring well and swale inspection at AOC 4.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/16/2021

Report No:	12	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 6 mph NE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Collected synoptic groundwater elevations from all temporary wells at AOC 5. Evaluated swales and existing MW conditions at AOC 4.	Y

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	8:00	11:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Cold weather, snow, solo onsite	Proceed with caution walking in snow on slopes and near water bodies			
Level:	D	C	B	A

Samples

COMMENTS: All temporary wells at AOC 5 were measured for depth to water, depth of well, stick-up height, and PID headspace screening. Evaluated water conditions in swales at AOC 4 for upcoming sampling program and inspected NYSDEC MW-1B (locked - unable to access), NYSDEC MW-2 (locked - unable to access), and NYSDEC MW-3 (damaged - unable to collect data) for access and to determine depth to water and well depth for upcoming temporary well installation.

Planned activities for next day: None

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/22/2021

Report No:	13	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 10 mph E		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Conduct scan for buried utilites at AOC-4 boring locations. All swale borings and temporary groundwater well locations were cleared of buried utilities.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:40	16:00	Y	N - utility scan oversight
Micheal Russett	GPRS	7:40	15:00	Y	N - utility scan

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Cold weather and hunting safety	Ensure proper winter clothing and high visibility vests due to small game hunting season.			
Level:	D	C	B	A

Samples

COMMENTS: All boring locations within the swales and the temporary groundwater well locations cleared of buried utilities.

Planned activities for next day: Drilling, vegetation clearing, conex box delivery on Monday 1/25/21.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by:	Joe Maule
Date:	1/25/2021
Report No:	14
Project No:	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works
Location of Work:	Baldwinsville, New York

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 3 mph NW		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Drillers brought all drilling equipment to the site and placed within the fenced staging area. Drilling began in the swales. All samples collected today were collected from 1-5 ft below ground surface.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	8:00	16:00	Y	N
Skylar Georgius	Bluestone	8:00	16:00	Y	N
Jeff Schweitzer	Nothnagle Drilling	9:10	15:30	Y	N
Andrew Hudson	Nothnagle Drilling	9:10	15:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
First day of drilling	Wearing appropriate PPE			
Level:	D	C	B	A

Samples	
NYOW-04-PH034-B	8330A, 8270D
NYOW-04-PH028-B	8330A, 8270D
NYOW-04-PH025-B	8330A, 8270D
NYOW-04-PH024-B	8330A, 8270D
NYOW-04-PH023-B	8330A, 8270D
NYOW-04-PH022-B	8330A, 8270D
NYOW-04-PH019-B	8330A, 8270D
NYOW-04-PH018-B	8330A, 8270D
NYOW-04-PH017-B	8330A, 8270D
NYOW-04-PH014-B	8330A, 8270D
NYOW-04-PH013-B	8330A, 8270D
NYOW-04-PH012-B	8330A, 8270D
NYOW-04-PH009-B	8330A, 8270D
NYOW-04-PH008-B	8330A, 8270D
NYOW-04-PH007-B	8330A, 8270D
NYOW-04-PH035-B (MS/MSD)	8330A, 8270D
EB-01_210125 (soils)	8330B, 8270D
NYOW-04-PH033-B	8330A, 8270D
NYOW-04-PH030-B	8330A, 8270D
NYOW-04-PH029-B	8330A, 8270D

COMMENTS: There is approximately 8 inches of snow cover on the ground.

Planned activities for next day: We will continue sampling the swales tomorrow.

Preparer Joe Maule

DAILY QUALITY CONTROL REPORT

Prepared by:	Joe Maule
Date:	1/26/2021
Report No:	15
Project No:	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works
Location of Work:	Baldwinsville, New York

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 3 mph NW		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Drilling in the swales concluded today. All samples collected today were collected from 1-5 ft below ground surface. GPRS was on site today. They cleared all outlet locations in preparation for sampling tomorrow.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	15:30	Y	N
Skylar Georgius	Bluestone	7:30	15:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	15:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	15:30	Y	N
Mike Russett	GPRS	8:00	9:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Snow	Slips, trips, falls and cold weather in the snow			
Level:	D	C	B	A

Samples	
NYOW-04-PH039-B	8330A, 8270D
NYOW-04-PH040-B	8330A, 8270D
NYOW-04-PH041-B	8330A, 8270D
NYOW-04-PH044-B	8330A, 8270D
NYOW-04-PH045-B	8330A, 8270D
NYOW-04-PH046-B	8330A, 8270D
NYOW-04-PH047-B	8330A, 8270D
NYOW-04-PH048-B	8330A, 8270D
NYOW-04-PH051-B	8330A, 8270D
NYOW-04-PH052-B (MS/MSD)	8330A, 8270D
NYOW-04-PH053-B	8330A, 8270D
PH-DUP-001_210126 (parent sample NYOW-04-PH053-B)	8330A, 8270D
NYOW-04-PH056-B	8330A, 8270D
NYOW-04-PH057-B	8330A, 8270D
NYOW-04-PH058-B	8330A, 8270D
NYOW-04-PH061-B	8330A, 8270D
NYOW-04-PH062-B	8330A, 8270D
NYOW-04-PH063-B	8330A, 8270D
PH-DUP-002_210126 (parent sample NYOW-04-PH063-B)	8330A, 8270D
NYOW-04-PH066-B	8330A, 8270D
NYOW-04-PH067-B	8330A, 8270D
NYOW-04-PH068-B	8330A, 8270D
NYOW-04-PH071-B	8330A, 8270D
NYOW-04-PH072-B	8330A, 8270D
NYOW-04-PH073-B	8330A, 8270D
NYOW-04-PH076-B	8330A, 8270D
NYOW-04-PH077-B	8330A, 8270D
NYOW-04-PH078-B	8330A, 8270D
EB-01_210126 (soils)	8330B, 8270D

COMMENTS: Snow began to fall around 11:00 and continued throughout the remainder of the day. GPRS did not detect any utilities by the outlet sampling locations today.

Planned activities for next day: We will begin sampling the outlets tomorrow.

Preparer Joe Maule

DAILY QUALITY CONTROL REPORT

Prepared by:	Joe Maule
Date:	1/27/2021

Report No:	16	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 9 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Drilling was completed at the outlets that do not have swallow-wort today. One temporary groundwater well was installed at NYOW-04-083.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	16:00	Y	N
Skylar Georgius	Bluestone	7:30	16:00	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	15:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	15:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Hand Injuries	Avoiding pinch points and using the correct tools for the task			
Level:	D	C	B	A

Samples	
NYOW-04-SL083-A	8330A, 8270D
NYOW-04-PH083-B	8330A, 8270D
NYOW-04-PH083-C	8330A, 8270D
NYOW-04-PH065-B	8330A, 8270D
NYOW-04-PH064-B	8330A, 8270D
NYOW-04-PH060-B	8330A, 8270D
NYOW-04-PH059-B	8330A, 8270D
NYOW-04-PH043-B	8330A, 8270D
PH-DUP-001_210127 (parent sample NYOW-04-PH043-B)	8330A, 8270D
NYOW-04-PH042-B	8330A, 8270D
NYOW-04-PH032-B	8330A, 8270D
NYOW-04-PH031-B	8330A, 8270D
NYOW-04-PH027-B	8330A, 8270D
NYOW-04-PH026-B	8330A, 8270D
PH-DUP-003_210127 (parent sample NYOW-04-PH026-B)	8330A, 8270D
NYOW-04-PH021-B	8330A, 8270D
NYOW-04-PH020-B	8330A, 8270D
NYOW-04-PH016-B	8330A, 8270D
PH-DUP-002_210127 (parent sample NYOW-04-PH016-B)	8330A, 8270D
NYOW-04-PH015-B (MS/MSD)	8330A, 8270D
EB-01_210127 (soils)	8330B, 8270D

COMMENTS: Samples were collected from the outlets that did not have swallow-wort in the apron of the bunkers. NYSDEC well locks were cut today. MW-2 had a DTW of 5.2 ft btoc/ 3.6 ft bgs, DTB of 11.1 ft btoc/ 9.5 ft bgs, and TOC of 1.6 ft. MW-1B does not appear to exist in its mapped location. There is a well nearby with screw cap that has been rusted shut. MW-3 is damaged and not able to be tagged. The casing is bent and the water level meter could not extend past 3.7 ft btoc. The wells were relocated with new locks, all keyed the same.

Planned activities for next day: We will continue soil sampling and installing temporary groundwater wells in areas that do not contain swallow-wort.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/28/2021

Report No:	17	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 11 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Surface and subsurface soil samples were collected at NYOW-04-002, NYOW-04-079, and NYOW-04-081 and temporary monitoring wells were installed.	N

Personnel On-site

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	15:30	Y	N
Skylar Georgius	Bluestone	7:30	15:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	15:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	15:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Ergonomics	lifting and moving safely			
Level:	D	C	B	A

Samples	
NYOW-04-SL081-A	8330A, 8270D
NYOW-04-PH081-B	8330A, 8270D
NYOW-04-PH081-C	8330A, 8270D
SL-DUP-001_210128 (parent sample NYOW-04-SL081-A)	8330A, 8270D
PH-DUP-001_210128 (parent sample NYOW-04-PH081-B)	8330A, 8270D
NYOW-04-SL079-A	8330A, 8270D
NYOW-04-PH079-B	8330A, 8270D
NYOW-04-PH079-C	8330A, 8270D
NYOW-04-SL002-A	8330A, 8270D
SL-DUP-002_210128 (parent sample NYOW-04-SL002-A)	8330A, 8270D
NYOW-04-PH002-B	8330A, 8270D
NYOW-04-PH002-C	8330A, 8270D
EB-01_210128 (soils)	8330B, 8270D

COMMENTS: Samples were collected from transect borings in areas where swallow-wort is not mapped.

Planned activities for next day: We will continue soil sampling and installing temporary groundwater wells in areas that do not contain swallow-wort tomorrow.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 1/29/2021

Report No:	18	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 12 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Surface and subsurface soil samples were collected at NYOW-04-004 and NYOW-04-005 and temporary monitoring wells were installed.	N

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	13:30	Y	N
Skylar Georgius	Bluestone	7:15	13:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	13:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	13:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Fridays	rushing and trying to move too quickly			
Level:	D	C	B	A

Samples	
NYOW-04-SL005-A	8330A, 8270D
NYOW-04-PH005-B	8330A, 8270D
NYOW-04-PH005-C	8330A, 8270D
NYOW-04-SL004-A	8330A, 8270D
NYOW-04-PH004-B	8330A, 8270D
NYOW-04-PH004-C	8330A, 8270D
EB-01_210128 (soils)	8330B, 8270D

COMMENTS: Surface and subsurface soil samples were collected from transect locations that did not have swallow-wort nearby.

Planned activities for next day: We will begin soil sampling and installing temporary groundwater wells in areas that have swallow-wort on Monday.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 2/1/2021

Report No:	19	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 9 mph W		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Groundwater samples were collected and protective well casings were installed.	N

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	8:15	14:30	Y	N
Skylar Georgius	Bluestone	7:00	13:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	9:35	14:30	Y	N
Andrew Hudson	Nothnagle Drilling	9:35	14:30	Y	N
Joshua Cook	NY DEC	10:30	11:30	Y	Y; NY DEC site visit

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Snow	wet and slippery conditions			
Level:	D	C	B	A

Samples	
NYOW-04-WL002-A	8330B, 8270D
NYOW-04-WL004-A	8330B, 8270D
WL-DUP-002_210201 (parents sample NYOW-04-WL004-A)	8330B, 8270D
NYOW-04-WL083-A	8330B, 8270D
NYOW-04-WL081-A	8330B, 8270D
WL-DUP-001_210201 (parent sample NYOW-04-WL079-A)	8330B, 8270D
NYOW-04-WL079-A	8330B, 8270D
NYOW-04-WL005-A	8330B, 8270D
EB-01_210201 (aqueous)	8330B, 8270D

COMMENTS: Protective outer casing was installed at NYOW-04-004 and NYOW-04-005. The drillers added protective road boxes to wells in the manicured area of AOC 5. Some transect locations were shifted closer to the road to avoid the swale next to the road, which the drill rig was unable to move around.

Planned activities for next day: Additional utility clearing will be performed at areas that needed to be moved for rig access. Land clearing for several locations will be performed tomorrow. Soil sampling will continue.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 2/2/2021

Report No:	20	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 9 mph W		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Soil samples were collected and temporary wells were installed at NYOW-04-0036, NYOW-04-080, and NYOW-04-082. Utility clearing was conducted at locations that were moved closer to the roads for access. Land clearing was conducted to access NYOW-04-037 and NYOW-04-038.	N

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	15:00	Y	N
Skylar Georgius	Bluestone	7:30	15:00	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	15:00	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	15:00	Y	N
Zane Presler	Nothnagle Drilling	11:30	13:30	Y	N
Avery Wall	Nothnagle Drilling	11:30	13:30	Y	N
Mike Russet	GPRS	12:00	13:00	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Driving Safety	drive slow and walk areas with snow first			
Level:	D	C	B	A

Samples	
NYOW-04-SL036-A	8330A, 8270D
NYOW-04-PH036-B	8330A, 8270D
PH-DUP-001_210202 (parent sample NYOW-04-PH036-B)	8330A, 8270D
NYOW-04-PH036-C	8330A, 8270D
NYOW-04-SL080-A	8330A, 8270D
NYOW-04-PH080-B	8330A, 8270D
NYOW-04-PH080-C	8330A, 8270D
NYOW-04-SL082-A	8330A, 8270D
NYOW-04-PH082-B	8330A, 8270D
NYOW-04-PH082-C	8330A, 8270D
EB-01_210202 (soils)	8330B, 8270D

COMMENTS: It snowed all day today and there are approximately 12 additional inches of snow on the ground. It should not impact progress.

Planned activities for next day: Soil sampling will continue.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 2/3/2021

Report No:	21	**Project No:** W912WJ-19-D-0001, W912WJ19F0056	
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 12 mph SE		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Soil samples were collected and temporary wells were installed at NYOW-04-084, NYOW-04-085, NYOW-04-037, NYOW-04-038, and NYOW-04-006. Soil samples were collected at NYOW-04-074 and NYOW-04-075.	N

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	15:30	Y	N
Skylar Georgius	Bluestone	7:30	15:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	15:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	15:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Slips, Trips and Falls	Long walks in the snow			
Level:	D	C	B	A

Samples	
NYOW-04-SL084-A	8330A, 8270D
NYOW-04-PH084-B (MS/MSD)	8330A, 8270D
NYOW-04-PH084-C	8330A, 8270D
NYOW-04-SL085-A	8330A, 8270D
NYOW-04-PH085-B	8330A, 8270D
PH-DUP-001_210203 (parent sample NYOW-04-PH085-B)	8330A, 8270D
NYOW-04-PH085-C (MS/MSD)	8330A, 8270D
NYOW-04-SL037-A	8330A, 8270D
NYOW-04-PH037-B	8330A, 8270D
NYOW-04-PH037-C	8330A, 8270D
NYOW-04-SL038-A	8330A, 8270D
NYOW-04-PH038-B	8330A, 8270D
NYOW-04-PH038-C	8330A, 8270D
NYOW-04-SL006-A	8330A, 8270D
NYOW-04-PH006-B	8330A, 8270D
NYOW-04-PH006-C	8330A, 8270D
PH-DUP-002_210203 (parent sample NYOW-04-PH006-C)	8330A, 8270D
NYOW-04-PH075-B	8330A, 8270D
NYOW-04-PH074-B	8330A, 8270D
PH-DUP-003_210203 (parent sample NYOW-04-PH074-B)	8330A, 8270D
EB-01_210203 (soils)	8330B, 8270D

COMMENTS: Plastic sheeting was placed under the drill rig at locations with swallow-wort.

Planned activities for next day: Soil sampling and groundwater sampling will continue tomorrow.

Preparer Joe Maule

DAILY QUALITY CONTROL REPORT

Prepared by:	Joe Maule
Date:	2/4/2021
Report No:	22
Project No:	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works
Location of Work:	Baldwinsville, New York

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Light	High	Direction: 6 mph E		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Soil samples were collected and temporary wells were installed at all remaining locations. Groundwater sampling occurred at seven locations. Three groundwater samples remain for tomorrow.	N

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	15:30	Y	N
Skylar Georgius	Bluestone	7:30	15:30	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:30	15:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:30	15:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Ergonomics	Lift with legs not back			
Level:	D	C	B	A

Samples	
NYOW-04-WL006-A	8330B, 8270D
NYOW-04-WL085-A	8330B, 8270D
NYOW-04-WL084-A	8330B, 8270D
NYOW-04-WL082-A	8330B, 8270D
NYOW-04-WL037-A	8330B, 8270D
NYOW-04-WL080-A	8330B, 8270D
NYOW-04-WL036-A	8330B, 8270D
NYOW-04-PH070-B	8330A, 8270D
NYOW-04-PH069-B	8330A, 8270D
NYOW-04-PH055-B	8330A, 8270D
NYOW-04-PH054-B	8330A, 8270D
NYOW-04-PH050-B	8330A, 8270D
NYOW-04-PH049-B	8330A, 8270D
NYOW-04-SL003-A	8330A, 8270D
NYOW-04-PH003-B	8330A, 8270D
NYOW-04-PH003-C	8330A, 8270D
NYOW-04-SL001-A (MS/MSD)	8330A, 8270D
NYOW-04-PH001-B (MS/MSD)	8330A, 8270D
NYOW-04-PH001-C	8330A, 8270D
PH-DUP-001_210204 (parent sample NYOW-04-PH001-C)	8330A, 8270D
NYOW-04-PH010-B	8330A, 8270D
NYOW-04-PH011-B	8330A, 8270D
EB-01_210204 (aqueous)	8330B, 8270D
EB-02_210204 (soils)	8330B, 8270D

COMMENTS: Groundwater samples at NYOW-04-037 and NYOW-04-082 have the minimum allowable sample volume (1L for 8270D and 500 ml for 8330B) due to insufficient recharge at both locations.

Planned activities for next day: Groundwater sampling will conclude tomorrow. Concrete pads will be installed at all temporary well locations and Bluestone and Nothnagle will demobilize from site.

Preparer Joe Maule

Bluestone ENVIRONMENTAL GROUP

DAILY QUALITY CONTROL REPORT

Prepared by: Joe Maule
Date: 2/5/2021

Report No:	23	**Project No:**	W912WJ-19-D-0001, W912WJ19F0056
Project Name:	Former New York Ordnance Works		
Location of Work:	Baldwinsville, New York		

Weather:

	Cloudy	Freezing Rain	T-storm	Snow	
Temp.:	0 to 32	32-50	50-70	70-85	85+
Wind:	Moderate	High	Direction: 14 mph N		
Humidity:	Dry	Moderate	High		

Project Activities:

Description of Project Activities:	**Completed? (Y / N)**
Groundwater sampling occurred at the three remaining locations. The drillers completed concrete pads for all temporary wells, decontaminated their drill rig, and left site.	Y

Name	Company	Start Time	Stop Time	Participated in Safety Briefing (Y/N)	Visitor (Y/N); Purpose of Visit
Joe Maule	Bluestone	7:30	12:00	Y	N
Skylar Georgius	Bluestone	7:00	12:00	Y	N
Jeff Schweitzer	Nothnagle Drilling	7:00	10:30	Y	N
Andrew Hudson	Nothnagle Drilling	7:00	10:30	Y	N

Health and Safety:

Topics:	**Information Reviewed (Reference Material Covered or Attach Copy)**			
Last Day on Site	Avoid rushing			
Level:	D	C	B	A

Samples	
NYOW-04-WL001-A (MS/MSD)	8330B, 8270D
NYOW-04-WL003-A	8330B, 8270D
NYOW-04-WL038-A	8330B, 8270D
EB-01_210205 (aqueous)	8330B, 8270D

COMMENTS: Groundwater sample at NYOW-04-038 has the minimum allowable sample volume (1L for 8270D and 500 ml for 8330B) due to insufficient recharge at location. There are five IDW drums staged in secondary containment in the decon pad. One drum contains AOC 4 soil cuttings. One drum contains AOC 5 soil cuttings. One drum contains AOC 5 purge and decontamination water. Two drums contain AOC 4 purge and decontamination water. All filled drums are appropriately labeled. There are six empty drums staged outside of the cones box inside the staging area. All empty drums are labeled as empty.

Planned activities for next day: None. Discrete AOC 4 sampling is complete.

Preparer Joe Maule

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APPENDIX C
Field Logs

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S. Georgios NYOW 1/4/21

0730 S. Georgios arrives on site. Site covered in snow so S. Georgios parks in nearby parking lot and walks over to AOC5.

0745 H&S Tailgate - Driving hazards.

0830 Based on communication with CENAE and NYSDEC, the staging area is being moved to AOC4.

0900 Fencing contractors set up 120 ft of fencing at AOC 4. Fencing currently a 30 x 30 area.

1030 Fencing contractors off site.

1035 Porta-John delivered to site and put inside of fencing.

1045 J. Schweitzer from Nothnagle arrived at AOC5.

10:50 Porta-John delivery off site. S.G. goes to AOC5 to meet J.S.

11:05 J.S. and S.G. flag all AOC5 locations and discuss land clearing.

12:00 J.S. and S.G. go to AOC4 and look at staging area and AOC4 drilling locations

12:31 J.S. off site.

1300 S. Georgios off site.

1/4/21

Rite in the Rain

S. Georgius NYOW 1/5/21

0850 SG on site.
Weather - Cloudy, chance of snow 36°F.
H&S - Cutting (PPE with chainsaws)
8:35 Skid steer dropped off at AOC5. Cones and high-vis used during unloading along road.
8:56 Drillers on site. H&S Tailgate. Drillers did a quick site walk before starting to clear.
9:15 Begins to snow.
1000 Continue land clearing
1030 Begin clearing at coal storage area.
1100 Continue clearing at coal storage area.
1135 Clearing at coal storage area continues.
1313 Finish clearing coal storage area.
1335 Begin clearing electric sub-station
1423 Finish clearing electric sub-station and begin clearing landfill.
1530 Drillers wrap up work.
1545 Drillers off site.
1605 JM arrives on site. JM/SG do site walk.

S. Georgius NYOW 1/5/21 5

16:30 JM + SG off site

1/5/21

Rite in the Rain

6 SGeorgius NYOW 1/6/21

0730 SG on site.
Weather- cloudy, high of 33°F
HBS- slips, trips, falls
0750 GPRS utility clearance on site.
HBS tailgate.
0800 JM on site. HBS tailgate.
Utility locate begins.
0843 Clear coal storage, coal aragegate bins, and boiler house with GPR and EM.
0900 Clear electric sub station with GPR and EM.
0915 Clear possible dump with EM.
*0930 Utility clearance off-site.
0910 Delayed entry - drillers on site with drill rig. Leave trailer at staging area.
0942 Josh Cook from NY DEC visits site. SG + JM show him coal aggregate bins and coal storage area clearing.
1015 Drillers start land clearing.
1030 SG goes over to the staging area and builds the decon
1200 Drillers done at AOC 5 (land clearing)

SGeorgius NYOW 1/6/21

1215 Drillers come to staging area and build decon pad.
1230 Drillers off site
1330 JM + SG off site.

1/6/21

Rite in the Rain

S. Georgius NYOW 1/7/21

0715 SG + drillers on site
0730 JM on site
HBS: cold weather
Weather - cloudy, high of 30
0745 Set up at NYOW-05-010
0930 Sample NYOW-05-010-A
0935 Sample NYOW-05-010-B
0940 Sample NYOW-05-010-C
0950 Build well. DTB = 12' bgs, filter pack to 2' bgs. Bentonite chips from 0-2' bgs. Screen is 8'.
1000 Set up at NYOW-05-009
1030 Sample NYOW-05-SL009-A
1035 Sample NYOW-05-PH009-B
1040 Sample NYOW-05-PH009-C
1100 Set up at NYOW-05-008
1150 Sample NYOW-05-SL008-A
1155 Sample NYOW-05-PH008-B
1200 Sample NYOW-05-PH008-C
1220 Drillers go to staging area to decon rods
1245 LM and TM on site
1315 Drilling and setting well at NYOW-05-008. DTB = 19' bgs. Screen is 10'. Filter pack from 9-19' bgs.

S. Georgius NYOW 1/7/21

1400 - Set up at NYOW-05-007
1440 - sample NYOW-05-SL007-A
1445 - sample NYOW-05-PH007-B
1450 - sample NYOW-05-PH007-C
0000 - sample PH-DUP-001_210107
↳ Sampled from NYOW-05-PH007-B
1450 - PID reading 0.0 ppm in breathing zone all day.
1515 - Collect EB-01_210107
1600 - courier picks up coolers (x2) on site.
1630 - JM + SG off site

1/7/21

Rite in the Rain

10 S.Georgius NYOW 1/8/21

0730 - JM + SG + Drillers on site. New drilling assistant on site. reviewed APP & HASP. Avery Wall - new helper

0800 - Start drilling at NYOW-05-006

0900 - Sample NYOW-05-SL006-A

0905 - Sample NYOW-05-PH006-B

0910 - Sample NYOW-05-PH006-C

0940 Build well at NYOW-05-006
DTB = 23
filterpack = 11-23
bentonite = 0-11
screen = 10' (no sump)

1000 Start drilling at NYOW-05-024

1130 Sample NYOW-05-SL024-A

1135 Sample NYOW-05-PH024-B

1140 Sample NYOW-05-PH024-C

1150 Build well at NYOW-05-024
DTB = 22
filterpack = 10-22
bentonite = 0-10
screen = 10' (no sump)

1210 Start drilling at NYOW-05-023

1230 Sample NYOW-05-SL023-A

1235 Sample NYOW-05-PH023-B

1240 Sample NYOW-05-PH023-C

S.Georgius NYOW 1/8/21 11

* Delayed Entry - Michael Belveg arrived onsite at 9:45am from NYDEC and left site at 10:45am.

1245 Start drilling at NYOW-05-022

1250 Sample NYOW-05-SL022-A

1255 Sample NYOW-05-PH022-B

1300 Sample NYOW-05-PH022-C

0000 Sample PH-DUP-001_210108 associated with NYOW-05-022-B

1310 Start drilling at NYOW-05-021

1320 Sample NYOW-05-SL021-A

1325 Sample NYOW-05-PH021-B

1330 Sample NYOW-05-PH021-C

1400 Start sampling at NYOW-05-

1420 Sample NYOW-05-SL020-A

1425 Sample NYOW-05-PH020-B

1430 Sample NYOW-05-PH020-C

~~1490 start sampling at NYOW-0~~ SG 1/8/21

1500 EB-01-210108 collected.

1530 SG off site

1/8/21

Rite in the Rain

12 S. Georgius NYOW 1/11/21

0730 - SG + EM on site. HBS - hand injuries
weather - cloudy, high of 37°F.
0816 - collect grab sample
NYOW-05-WL008-A
0913 Drillers on site. Cory Dillon new to site.
0932 Rig jumps track getting back to NYOW-05-010.
0945 Trucks repaired
1035 Install temporary well at NYOW-05-010
1108 Set up at NYOW-05-025
1200 sample NYOW-05-SL025-A
1215 Sample NYOW-05-PH025-B
1220 sample NYOW-05-PH025-C
1230 Install well at NYOW-05-025
DTB = 22' bgs (refusal @ 22')
screen = 10'
filterpack = 10-22' bgs
bentonite = 0-10' bgs
1300 Set up at NYOW-05-018
1330 sample NYOW-05-SL018-A
1335 sample NYOW-05-PH018-B
1340 sample NYOW-05-PH018-C
1400 set up at NYOW-05-019 1/11/21

S. Georgius NYOW 1/11/21 13

1430 sample NYOW-05-SL019-A
1435 sample NYOW-05-PH019-B
1440 sample NYOW-05-PH019-C
* late entries
1120 sample NYOW-05-WL024-A
1230 sample NYOW-05-WL006-A
1420 sample EB-01-210111
1500 set rig up in landfill area
1530 sample EB-02-210111
1600 sample pick up. Off site

1/11/21

Rite in the Rain

S Georgius NYOW 1/12/21

0730 - SG, OB (CENAE), EM, and drillers on site.
HES - slips, trips, falls
0800 - Set up at NYOW-05-005
0920 sample NYOW-05-SL005-A
0925 Sample NYOW-05-PH005-B
0930 Sample NYOW-05-PH005-C
1030 NYOW-05-010
stick-up = 2.69'
DTW = 3.04' btoc
DTB = 20.38' btoc
1050 sample NYOW-05-WL010-A
1145 NYOW-05-025
stick-up = 2.07'
DTW = 8.54' btoc
DTB = 18.23' btoc
1155 sample NYOW-05-WL025-A
~~1200 WL-DUP-001_210112 sampled from NYOW-05-025~~ not sampled SG 1/12/21
NYOW-05-017
stick-up = 2.52'
DTW = 6.56' btoc
DTB = 21.81' btoc
1830 off site

1/12/21

S Georgius NYOW 1/13/21

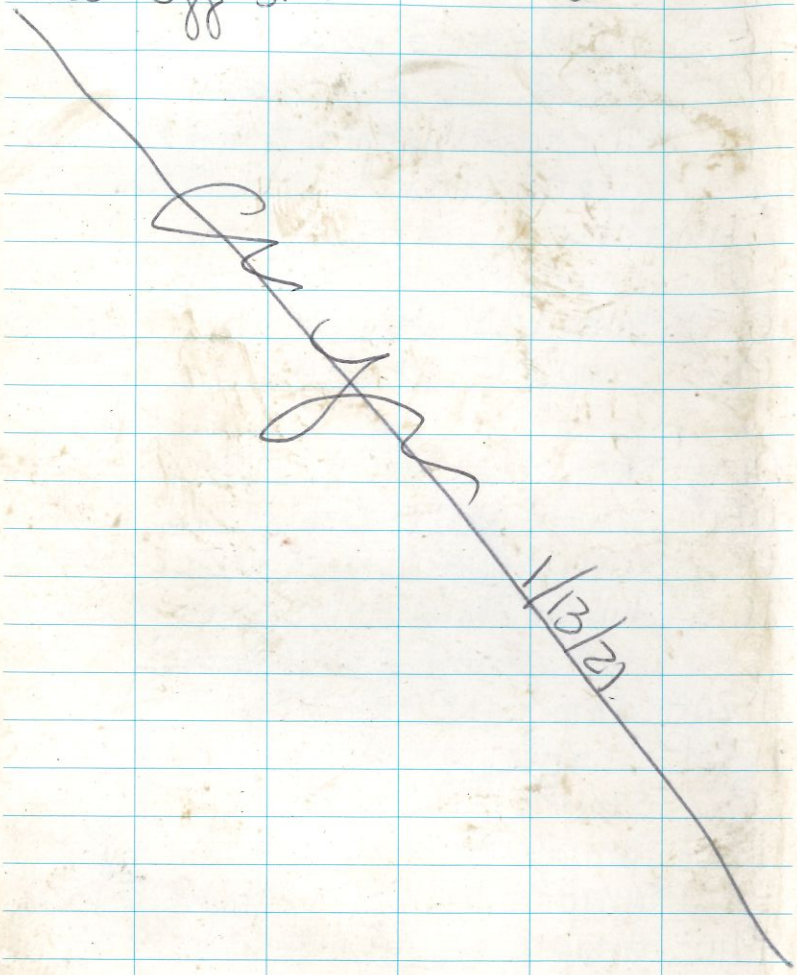
0730 - on site. HES - COVID-19
0800 - Geophysics (Bob Krause) on site.
0910 - set up at NYOW-05-001
stick-up = 1.44'
DTB = ~~4.4~~ SG 1/13/21 22.34' btoc
DTW = 4.48' btoc
0930 - sample NYOW-05-WL001-A MS/MSD
Well repeatedly went dry. full MS/MSD suite not collected until 1530.
* late entry →
0845 - sample NYOW-05-SL011-A
0850 - sample NYOW-05-PH011-B
0855 - sample NYOW-05-PH011-C

0940 - sample NYOW-05-SL012A
0945 - sample NYOW-05-PH012-B
0950 - sample NYOW-05-PH012-C
1015 - drillers break to get more supplies at staging area.
1320 - sample NYOW-05-SL013-A
1324 - sample NYOW-05-PH013-B
1327 - sample NYOW-05-PH013-C
1400 - sample NYOW-05-SL014-A
1405 - sample NYOW-05-PH014-B
1410 - sample NYOW-05-PH014-C

Rite in the Rain

16 S. Georgius NYOW 1/13/21

1610 - sample NYOW-05-SC015-A
1612 - sample NYOW-05-PH05-B
1620 - sample NYOW-05-PH15-C
1625 - JM finishes logging
1700 - off-site



S. Georgius NYOW 1/14/21 17

0730 - On site. H&S - Ergonomics
Weather - cloudy, high of 41°F.
0800 - Set up at NYOW-05-004
Stick-up = 1.89'
DTW = 2.99' btoc
DTB = 21.65' btoc
0815 - sample NYOW-05-WL004-A and FD
0900 - set up at NYOW-05-005
Stick-up = 1.54'
DTW = 3.65' btoc
DTB = 22.65' btoc
0930 - sample NYOW-05-WL005-A
1130 - set up at NYOW-05-012
Stick up = 2.06'
DTW = 11.93' btoc
DTB = 28.14' btoc
1155 - sample NYOW-05-WL012-A
* late entry.
0940 - stepped off NYOW-05-017 due to shallow refusal. Renamed step-off NYOW-05-017-1.
1030 - Based on conversation with F. Sevold the sample ID was switched back.
~~1155 - sample NYOW-05-K~~ SG 1/14/21
2000 - WL-DUP-002_210114 from -012-A

Rite in the Rain

18 S. Georgius NYOW 1/14/21

1315 collect NYOW-05-SL016-A

1320 collect NYOW-05-PH016-B

1325 collect NYOW-05-PH016-C.

1445 Drillers off-site to get equipment at staging area.

1500 collect EB-01_210114 using plastic shovel

1515 collect EB-02_210114 using waterlevel meter.

1600 drop-off samples off-site.

1/14/21

1/15/21 NYOW - AOC5

Sunny Clear 28°F am

Purpose: complete NYOW-05-016 & collect gw samples from NYOW-05-016, 17 & 19

800 JAM onsite

Calibrate Horiba U-5000

pH	3.59
mS/cm	4.82
NTU	49.2
mg/L DO	15.68
% DO	107.2

900 DTW-NYOW-05-019 = 6.32' btoc

Stick-up = 2.58' ags

DOW = 21.51' btoc

905 Driller onsite; H&S

- Cold weather; Friday Rush, equipment hazards

910 Begin Purge NYOW-05-019

925 Temp 6.78 °C DO 11.08

pH 7.70 %DO 89.8

ORP -213

Turb 1000

Cond 0.396

$\boxed{925}$ Collect $\boxed{\text{NYOW-05-WL019A}}$

~~930~~ DTW@NYOW-05-019 = 11.01 btoc

0925 JAM

Rite in the Rain

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1/15/21 NYOW-ROC5

950 JAM to ROC4 for dumpster delivery

1130 Setup on NYOW-05-017-1

1135 DTW = 13.42 'btoc
S-U = 1.11 'ags
DOW = 29.64 'btoc

1145 Begin Purge NYOW-05-017-1

1200 End purge - No water returns until tubing shortened - intake @ ~~20'~~ 25' btoc

pH	8.04
Temp	8.53
ORP	-230
Cond	0.386
Turb	1000
DO	10.59
DO%	90.9

1202 Collect NYOW-05-WLC017-1-A

1220 Single collection complete
DTW = 24.11' btoc (017-1)

1230 017-1 DTW = 21.01' btoc

1235 Setup @ NYOW-05-016
DTW 12.58 'btoc
DOW ~~26.75pm~~ 'btoc 27.95 - tape sticking inside PVC
SU 2.40 'ags

(cont'd →)

1/15/21 NYOW-ROC5

1240 Begin Purge NYOW-05-016

1241 End Purge

pH	8.01
Temp	9.42
ORP	-375
Cond	0.460
Turb	1000
DO	12.84
%DO	111.4

1244 Collect NYOW-05-016A

1303 Collection complete
DTW = 16.04' btoc

1310 DTW 016 = 13.56' btoc

1515 JAM offsite to ROC4
Dumpster delivered

1330 Driller offsite

1330-1440 ROC4 Kick-off call

1445 Collect EB-01-210115

1510 JAM to ROC5 to wait for courier

1600 Courier pick-up samples

1605 JAM offsite

Rite in the Rain

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1/22/21 NYOW-AOC4
30°F Snow
Mark out Utility locations
J. Mule (BEG), Mike
740 All onsite - H&S; check in
w/ DEC staff & prep equipment
JAM markout locations; GPRS
clear w/ RF detector & GPR
(where applicable - ie not in swales)
800 PH006 ~~Pre Photo~~ 7am Clear - Photo - Moved
~~PH038~~ 7am 10am North along transect
PH033 Clear - Photo
PH035 Clear - Photo
PH034 Clear - Photo
PH030 Clear - Photo
PH029 Clear - Photo
PH028 Clear - Photo
PH025 Clear - Photo
PH024 Photo - Clear
PH023 Clear - Photo
PH022 Clear - Photo
PH019 Photo - Clear
PH018 Photo - Clear
PH017 Photo - Clear
PH014 Clear

(Cont'd →)

1/22/21 NYOW-AOC4
PH013 - SW - Photo - Clear
PH012 - SW - Photo - Clear
PH009 - SW - Photo - Clear
PH008 - SW - Photo - Clear
PH007 - SW - Photo - Clear
PH039 - Photo - Clear
PH040 - Photo - Clear
Equipment: Metrotex 5X & GSSI 4000 w/
400 MHz antenna
PH041 - Photo - Clear
PH044 - Photo - Clear
PH045 - Photo - Clear
PH046 - Photo - Clear
PH~~045~~ 047 - Photo - Clear
~~PH046~~ PH048 - SW - Photo - Clear
PH051 - SW - Photo - Clear
PH052 - Photo - Clear
PH053 - Photo - Clear
PH056 - Photo - Clear
PH057 - Photo - Clear
PH058 - Photo - Clear
PH061 - SW - Photo - Clear
PH062 - Photo - Clear

(Cont'd →)

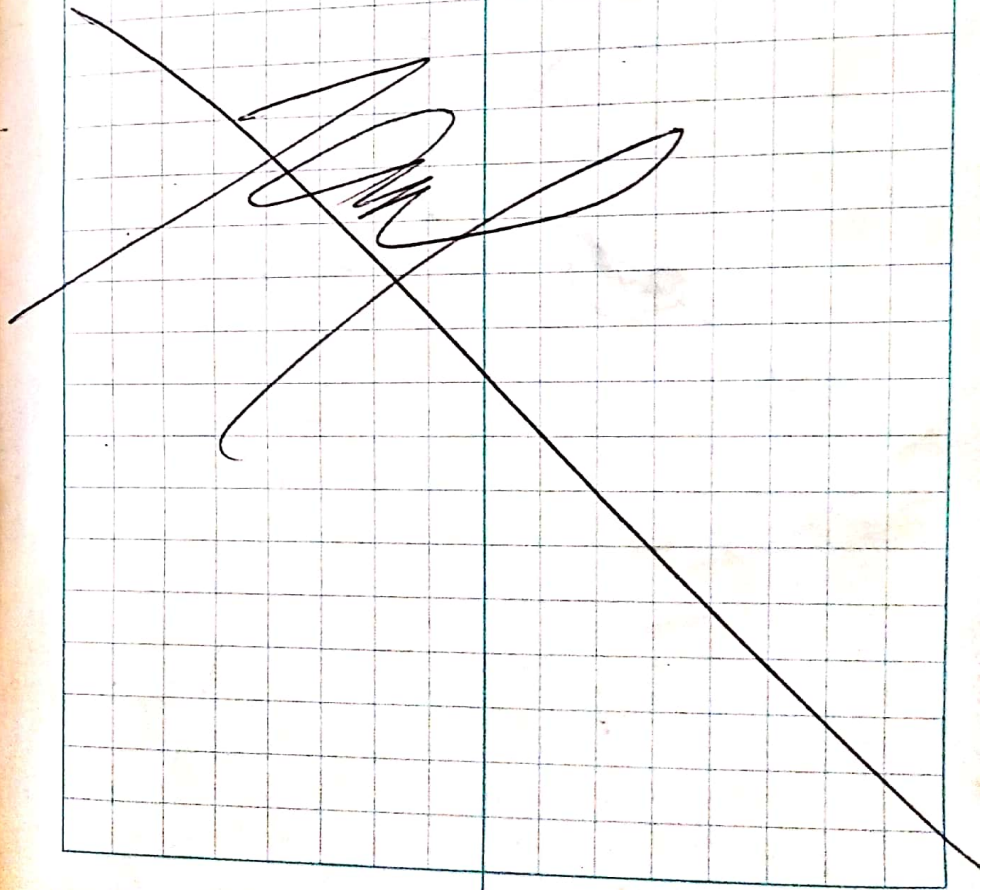
Scanned with CamScanner

1/21/21 NYOW - AOC 4

PH063 - Photo - Clear
1047 PH066 - Photo - Clear
PH067 - Photo - Clear
PH068 - Photo - Clear
PH071 - Photo - Clear
PH072 - Photo - Clear
PH073 - Photo - Clear
PH076 - Photo - SW - Clear
45 PH077 - Photo - Clear
1130 45 PH078 - Photo - Clear
PH085 - Photo - Clear - veg clear
PH084 - Photo - Clear - minor veg clear
PH083 - Photo - Clear - no clearing ~~minor veg clear~~
PH082 - Photo - Clear - minor veg clear
PH081 - Photo - Clear - minor Veg clear
PH080 - Photo - Clear
1230 PH079 - Photo - Clear
1245 PH005 - Photo - Clear - moved point East along transect - 005 relocated
PH004 - Photo - Clear
PH003 - Relocate N along transect to avoid wetlands - Photo - Clear Veg
PH002 - Photo - Clear
PH036 - Relocate N along transect Photo - Clear (cont'd →)

1/21/21 NYOW - AOC 4

- Unable to find NYSDEC - MW-1B; however an unmarked well to the north of NYSDEC MW-1B was located.
PH038 - Photo - Clear - Veg clear
PH037 - Photo - Clear - Veg clear
57 PH001 - Photo - Clear
61
1500 GARS Offsite
1600 JAM Offsite



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S. Georgius NYOW 1/25/21 19

0800 - SG + JM on site.
weather - partly cloudy, high of 30°F
h 2 S - first day of drilling at AOC4.
wearing appropriate PPE.
0830 - JM leaves site to buy snow
shovel + ice. Approx. 8 inches
of snow on ground.
0910 - Drillers from Nothnagle on-site.
0915 - JM back on site.
0920 - NYDEC maintenance cleared
snow from parking lot.
0940 - snow removed from ground
staging area. Drillers set up
in staging area.
1013 - set up at NYOW-04-PH035
1030 - sample NYOW-04-PH035-B
1035 - set up at NYOW-04-PH034
1045 - sample NYOW-04-PH034-B
1050 - set up at NYOW-04-PH033
1055 - sample NYOW-04-PH033-B
1100 - set up at NYOW-04-PH030
1105 - sample NYOW-04-PH030-B
1110 - set up at NYOW-04-PH029
1115 - sample NYOW-04-PH029-B
1120 - set up at NYOW-04-PH028

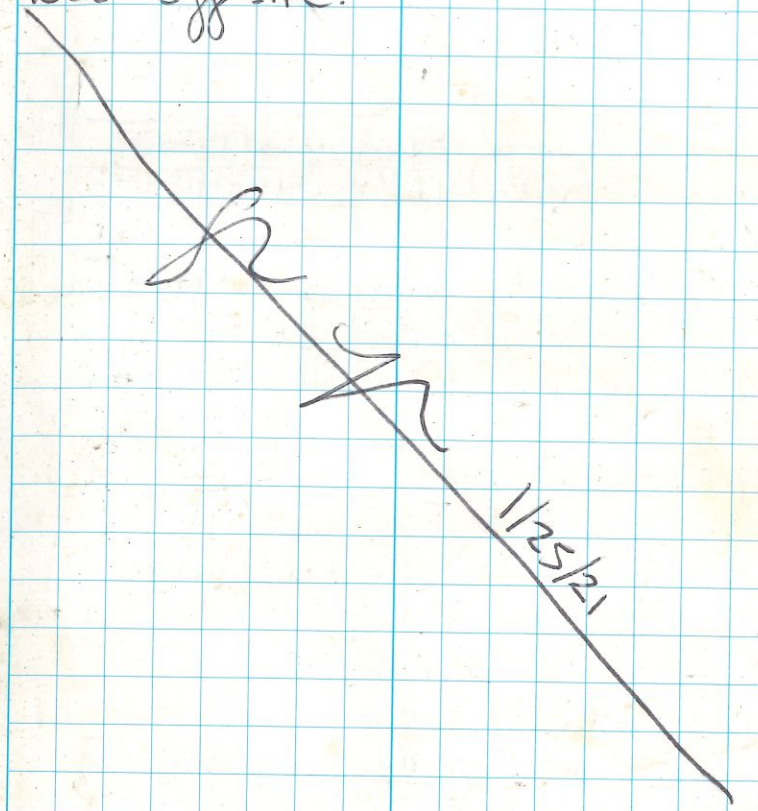
Rite in the Rain

S. Georgios NYOW 1/25/21

1125 - sample NYOW-04-PH028-B
1135 - set up at NYOW-04-PH025
1145 - sample NYOW-04-PH025-B
1155 - set up at NYOW-04-PH024
1200 - sample NYOW-04-PH024-B
1230 - set up at NYOW-04-PH023
1245 - sample NYOW-04-PH023-B
1255 - set up at NYOW-04-PH022
1300 sample NYOW-04-PH022-B
1310 set up at NYOW-04-PH019
1315 sample NYOW-04-PH017-B
1320 set up at NYOW-04-PH018
1325 sample NYOW-04-PH018-B
1330 set up at NYOW-04-PH017
1335 sample NYOW-04-PH017-B
1340 set up at NYOW-04-PH014
1345 sample NYOW-04-PH014-B
1355 set up at NYOW-04-PH013
1400 sample NYOW-04-PH013-B
1405 set up at NYOW-04-PH012
1410 sample NYOW-04-PH012-B
1415 set up at NYOW-04-PH009
1420 sample NYOW-04-PH009-B
1425 set up at NYOW-04-PH008
1430 sample NYOW-04-PH008-B

S Georgios NYOW 1/25/21

1440 set up at NYOW-04-PH007
1445 sample NYOW-04-PH007-B
1500 dispose of soil cuttings in labeled drum.
1530 collect EB-01_20125
1600 off site.



Rite in the Rain

S. Georgius NYOW 1/26/21

0730 On site. Weather - cloudy w/snow, high of 30°F
HBS - Snow → slips, trips, falls, cold
0750 set up at NYOW-04-PH039
0800 MiRe Russell of GPRS on site. Clears around outlets of all tankers (24 locations total)
0810 sample NYOW-04-PH039-B
0815 set up at NYOW-04-PH040
0830 sample NYOW-04-PH040-B
0840 set up at NYOW-04-PH041
0845 sample NYOW-04-PH041-B
0850 set up at NYOW-04-PH044-1
0855 sample NYOW-04-PH044-B
0900 set up at NYOW-04-PH045
0905 sample NYOW-04-PH045-B
0910 set up at NYOW-04-PH046
0915 sample NYOW-04-PH046-B
0920 set up at NYOW-04-PH047
0925 sample NYOW-04-PH047-B
0930 set up at NYOW-04-PH048
0935 sample NYOW-04-PH048-B
0940 set up at NYOW-04-PH051
0945 sample NYOW-04-PH051-B
1000 set up at NYOW-04-PH052
1005 sample NYOW-04-PH052-B MS/MSD

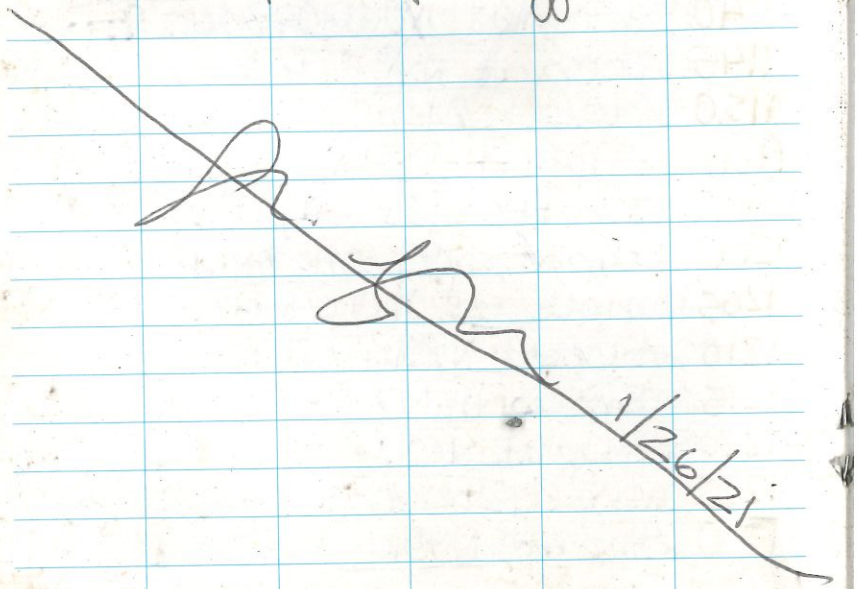
S. Georgius NYOW 1/26/21

1025 set up at NYOW-04-PH053
1030 sample NYOW-04-PH053-B
0000 sample PH-DUP-001_210126 from PH053.
1040 set up at NYOW-04-PH56
1045 sample NYOW-04-PH56-B
1050 set up at NYOW-04-PH057
1055 sample NYOW-04-PH057-B
1100 set up at NYOW-04-PH058-1
1105 sample NYOW-04-PH058-B
1125 set up at NYOW-04-PH061
1130 sample NYOW-04-PH061-B
1135 set up at NYOW-04-062
1140 sample NYOW-04-062-B
1145 set up at NYOW-04-PH063
1150 sample NYOW-04-PH063-B
0000 sample PH-DUP-007_210126 from PH063.
1200 set up at NYOW-04-PH066
1205 sample NYOW-04-PH066-B
1210 set up at NYOW-04-PH067
1215 sample NYOW-04-PH067-B
1220 set up at NYOW-04-PH068
1225 sample NYOW-04-PH068-B
1230 set up at NYOW-04-PH071

Rite in the Rain

24 S. Georgian NYOW 1/26/21

1235 sample NYOW-04-PH071-B
1240 set up at NYOW-04-PH072
1245 sample NYOW-04-PH072-B
1300 set up at NYOW-04-PH073
1305 sample NYOW-04-PH073-B
1315 set up at NYOW-04-PH076
1320 sample NYOW-04-PH076-B
1330 set up at NYOW-04-PH077
1335 sample NYOW-04-PH077-B
1400 set up at NYOW-04-PH078
1415 sample NYOW-04-PH078-B
1515 sample EB-01-210126
1530 lab pick-up. off site.



0730 - SG + Drillers onsite.
weather - Cloudy, high of 27°F
0800 - JM on site.
HBS - hand injuries.
JM takes "pre-construction" photos at each bunker while driller + SG set up at NYOW-04-075.
0900 JM decides that all bunkers with swallowwart must be sampled last. Everyone moves to NYOW-04-065 to start instead.
0930 sample NYOW-04-PH065-B
0935 set up at NYOW-04-PH064
0940 sample NYOW-04-PH064-B
0945 set up at NYOW-04-PH060
0950 sample NYOW-04-PH060-B
0955 set up at NYOW-04-PH059
1000 sample NYOW-04-PH059-B
1010 set up at NYOW-04-PH043
1015 sample NYOW-04-PH043-B + FD-001
1020 set up at NYOW-04-PH042
1025 sample NYOW-04-PH042-B
1034 set up at NYOW-04-PH015
1055 sample NYOW-04-PH015-B MS/MSD
1100 set up at NYOW-04-PH016
1110 sample NYOW-04-PH016-B FD-002

1120 set up at NYOW-04-PH020
1130 sample NYOW-04-PH020-B
1140 set up at NYOW-04-PH021
1150 sampling NYOW-04-PH021-B
1200 set up at NYOW-04-PH026
1215 sample NYOW-04-PH026-B FD-003
1220 set up at NYOW-04-PH027
1230 sample NYOW-04-PH027-B
1250 set up at NYOW-04-PH031-
1300 sample NYOW-04-PH031-B
1305 set up at NYOW-04-PH032
1310 sample NYOW-04-PH032-B
1330 MW-2
DTW = 5.20 ft btoc / 3.6 ft bgs
DTB = 11.1 ft btoc / 9.5 ft bgs
TOC = 1.6 ft ags
MW-1B, MW-3 not viable / accessable.
1340 set up at NYOW-04-083
1400 sample NYOW-04-SL083-A
1410 sample NYOW-04-PH083-B
1420 sample NYOW-04-PH083-C
1515 collect EB-01-210127
* late entry - 155 set 083 @ 20.5' bgs.
1600 off-site.

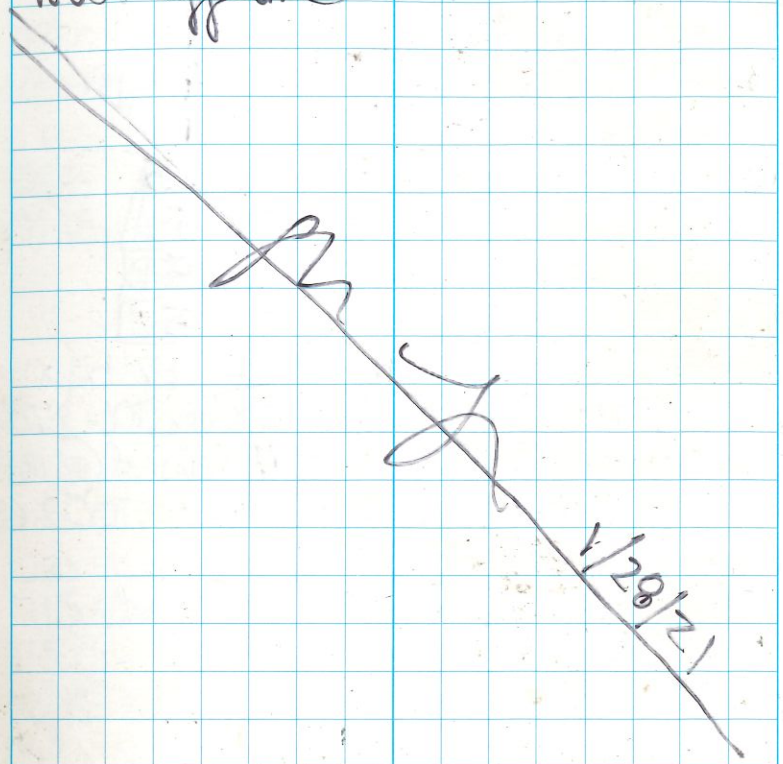
1/27/21

S. Georgius NYOW 1/28/21

0730 - SB + drillers on site.
weather - cloudy, currently snowing
high of 17°F.
0750 - JM on site.
HBS - Ergonomics
*late entry from 1/27/21 → NYOW-04-083
DTW = 6.18' btoc
DTB = 23.08' btoc
TOC = 3.27' ags.
0800 - Moving from -083 to -081.
set up at NYOW-04-081
0820 sample NYOW-04-SL081-A FD(SL-001)
0830 sample NYOW-04-PH081-B FD(PH-001)
0840 sample NYOW-04-PH081-C
0951 hit refusal @ 18.5 ft bgs
constructed well. DTW = 8.86' btoc,
DTB = 21.59' btoc, TOC = 3.14' ags.
1030 set up at NYOW-04-079
1130 sample NYOW-04-SL079-A
1140 sample NYOW-04-PH079-B
1150 sample NYOW-04-PH079-C
1203 hit refusal @ 19.8 ft bg.
constructed well. DTW = 7.52' btoc
DTB = 22.4' btoc, TOC = 2.77' ags.
1300 set up at NYOW-04-002
1400 sample NYOW-04-SL002-A (FD-SL002)

S Georgius NYOW 1/28/21

1410 sample NYOW-04-PH002-B
1420 sample NYOW-04-PH002-C
hit refusal @ 12.5' bgs.
constructed well. DTW = 6.47' btoc
DTB = 14.15' btoc, TOC = 2.67' ags
1500 sample EB-01-210128
1510 lab collected samples
1530 off site



Rite in the Rain

32 S. Georgia NYOW 1/29/21

0715 SG on site - unload coolers
0730 Drillers on site. Weather - snow, high of 16°F
0745 JM on site - unload more coolers. HBS - Fridays/rushing.
0800 Scoped out next drilling locations. ~~5~~ SG 1/29/21
0830 set up at NYOW-04-004
0900 sample NYOW-04-004-A
0910 sample NYOW-04-PH004-B
0920 sample NYOW-04-PH004-C
1000 set up at NYOW-04-005
1015 sample NYOW-04-SL005-A
1025 sample NYOW-04-PH005-B
1035 sample NYOW-04-PH005-C
~~@~~1100 Refusal @ ~~16~~ SG 1/29/21 17' bgs
DTW = 5.79' btoc, DTB = 17.59' btoc, TOC = 2.70' ags
*Late entry - NYOW-04-004 refusal @ 16' bgs
DTW = 5.23' btoc, DTB = 18.58' btoc, TOC = 2.65' ags
1300 Collect EB-01_210129
1330 Lab pick up. SG off site.

1/29/21

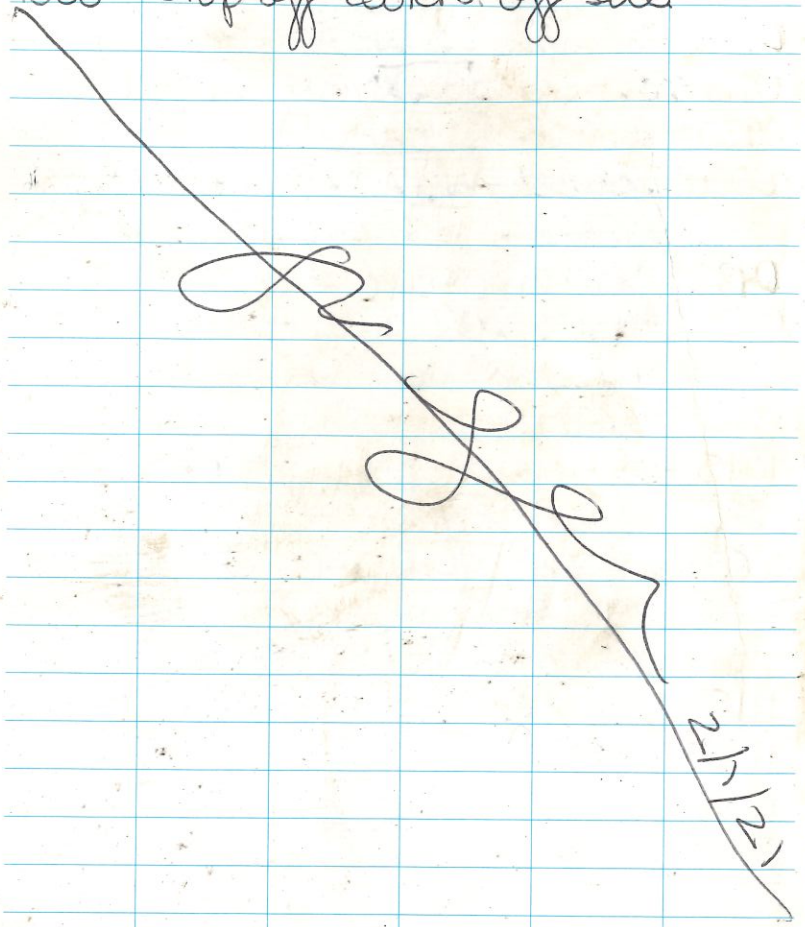
S. Georgia NYOW 2/1/21 33

0700 SG on site. Organizes coolers for the week.
weather - snow, high of 30°F
0815 - JM on site with ice.
HBS - Snow - slips, trips, falls
0830 - Set up at NYOW-04-083
0900 - sample NYOW-04-WL083-A
0915 - set up at NYOW-04-081
0930 - sample NYOW-04-WL081-A
~~0000 sample WL-DUP-001_210201 from -081-A~~ SG 2/1/21 well dry, no dup.
0935 - Driller on site.
0938 - NYOW-04-081 went dry. Wait, and then continue filling bottles.
1015 - set up at NYOW-04-079.
1030 - sample NYOW-04-WL079-A
0000 - sample WL-DUP-001_210201 from 079.
1050 - set up at NYOW-04-002
1115 - sample NYOW-04-WL002-A
1150 - set up at NYOW-04-004
1205 - sample NYOW-04-WL004-A
0000 - sample WL-DUP-002_210201 from -004.

Rite in the Rain

34 S.Georgious. NYOW 2/1/21

1245 set up at NYOW-04-005.
1315 sample NYOW-04-WL005-A
1400 sample EB-01_210201
1415 Move rig to NYOW-04-036 to start tomorrow.
1500 Drop off coolers off-site



S.Georgius NYOW 2/2/21

0730- SG + drillers on site
HBS: Driving Safety
Weather: Snow, high of 28°F
0800- JM on site with ice.
0810- set up at NYOW-04-036
0840 sample NYOW-04-SL036-A
0850 sample NYOW-04-PH036-B
0000 sample PH-DUP-01_210202
from -036
0900 sample NYOW-04-PH036-C
refusal @ 15,5' bgs. build well.
DTW = 7.06 btoc. DTB = 19.12' btoc
TD = 2.81' agc.
0930 Moved rig to NYOW-04-080.
could not begin drilling because new utility clearance is required for adjusted point. Waiting on utility clearance and land clearers to arive onsite.
1130- land clearers arive onsite. begin clearing at NYOW-04-037 and -038. HBS tailgate done.
1200- GPRS on site. HBS tailgate done.

Rite in the Rain

S. Georgios NYOW 2/2/21

1210 set up at NYOW-04-080 and start drilling after location is cleared.
1220 sample NYOW-04-SL080-A
1225 sample NYOW-04-PH080-B
1230 sample NYOW-04-PH080-C
1240 Refusal @ 15' bgs. Construct well. DTW=5.75', DTB=17.80', TOC=2.
1300 GPRS off site.
1320 Set up at NYOW-04-082
1345 sample NYOW-04-SL082-A
1350 sample NYOW-04-PH082-B
1355 sample NYOW-04-PH082-C
Refusal @ 15.5' bgs. DRY
DTW=Dry, DTB=18.09' btoc, TOC=2.68'
1430 collect EB-01-210202
1500 off site

2/2/21

S. Georgios NYOW 2/3/21

0730 - SG + Drillers on site.
HAS => slips, trips, falls
Weather => Snow, high of 31°F
0745 - JM on site.
0750 - set up at NYOW-04-084
0810 - sample NYOW-04-SL084-A
0820 - sample NYOW-04-PH084-B MS/MSD
0830 - sample NYOW-04-PH084-C
0850 - refusal @ 19' bgs.
DTW=7.39' btoc, DTB=20.21' btoc, TOC=2.98' ags
0920 - set up at NYOW-04-085
0930 - sample NYOW-04-SL085-A
0940 - sample NYOW-04-PH085-B
0000 - sample @ PH-DUP-001.210203
0950 - sample NYOW-04-PH085-C MS/MSD
0955 - refusal @ 10.5' bgs on black shale. 7' screen
DTW=5.58' btoc, DTB=13.24' btoc, TOC=2.80'
1030 set up at NYOW-04-037
1040 sample NYOW-04-SL037-A
1050 sample NYOW-04-PH037-B
1100 sample NYOW-04-PH037-C
1105 Refusal @ 13.0' bgs
DTW=14.96, DTB=15.21, TOC=2.35' ags

Rite in the Rain

1130 - set up at NYOW-04-038
1145 sample NYOW-04-SL038-A
1155 sample NYOW-04-PH038-B
1205 sample NYOW-04-PH038-C
1210 Refusal @ 11.5' bgs. DRY
TOC = 2.40' ags, DTW = DRY
DTB = 13.35' btoc
1230 set up @ NYOW-04-006
1250 sample NYOW-04-SL006-A
1300 sample NYOW-04-PH006-B
1310 sample NYOW-04-PH006-C
0000 sample PH-DUP-002_210203 from 006-C
1315 Refusal @ 2' bgs
DTW = 8.85' btoc, DTB = N/A, TOC = 2.89' ags
1320 set up @ NYOW-04-075
1355 sample NYOW-04-PH075-B
1410 set up @ NYOW-04-074
1420 sample NYOW-04-PH074-B
0000 sample PH-DUP-003_210203
from 074-B
1445 collect EB-01_210203
1530 off site

2/3/21

0730 - SG + drillers on site.
Weather - cloudy, high of 36°F
H&S - Ergonomics.
0745 - JM on site w/ ice
0800 - set up @ NYOW-04-006
0820 - sample NYOW-04-WL006-A
0835 - set up @ NYOW-04-085
0850 - sample NYOW-04-WL085-A
0930 - set up @ NYOW-04-084
0940 - sample NYOW-04-WL084-A
0950 - NYOW-04-038 is dry. Unable to sample.
1015 - set up @ NYOW-04-082. Well is not expected to recover, due to screened zone (dry during install).
1020 - sampled NYOW-04-WL082-A only one bottle collected for SVOCs and Explosives, respectively (2 bottles, 1 L total). Recharge very slow.
10:40 - set up @ NYOW-04-037. Poor recovery expected.
10:50 - sampled NYOW-04-WL037-A minimum volume collected.

Rite in the Rain

*Late Entry →

0825 - set up @ NYOW-04-070
0830 - sample NYOW-04-PH070-B
0835 - set up @ NYOW-04-069
0840 - sample NYOW-04-PH069-B
0905 - set up @ NYOW-04-055
0910 - sample NYOW-04-PH055-B
0915 - set up @ NYOW-04-054
0920 - sample NYOW-04-PH054-B
0925 - set up @ NYOW-04-050
0940 - sample NYOW-04-PH050-B
0950 - set up @ NYOW-04-049
0955 - sample NYOW-04-PH049-B
*End of late entries →
1120 - set up @ NYOW-04-080
1130 - sample NYOW-04-PH080-B
1200 - set up @ NYOW-04-036
1220 - sample NYOW-04-WL036-A
*Late Entry →
1035 - set up @ NYOW-04-003
1050 sample NYOW-04-SL003-A
1055 sample NYOW-04-PH003-B
1100 sample NYOW-04-PH003-C
1125 set up @ NYOW-04-001
1200 sample NYOW-04-SL001-A MS/MSD
1205 sample NYOW-04-PH001-B MS/MSD

1210 sample NYOW-04-PH001-C
0000 sample PH-DUP-001_210204
1305 set up on NYOW-04-011
1315 sample NYOW-04-PH011-B
1330 sample NYOW-04-PH010-B
*End Late Entry →
1400 EB-01_210204 aqueous
1415 EB-02_210204 soil
1530 off site

2/4/21

Rite in the Rain

S. Georgius NYOW 2/5/21

0700 - SG + drillers on site
HBS - last day on site
Weather - Cloudy, high of 40°F
0730 - set up @ NYOW-04-038
0745 - sample NYOW-04-WL038-A.
(1/2 water volume due to recharge)
0810 - set up @ NYOW-04-001.
DTW - 3.78 btoc, DTB - 17.06 btoc,
TOC - 2.72 'ags.
Drillers decon rig and load onto truck.
0830 - sample NYOW-04-WL001-A MS/MSD
0930 - set up @ NYOW-04-003.
DTW - 5.64 'btoc, DTB - 17.25' btoc
TOC - 2.80' ags.
0950 - sample NYOW-04-WL003-A
1030 - sample EB-042210205
Drillers off site.
1045 IDW
on decon pad
1 drum w/ AOC4 soil cuttings
1 drum w/ AOC5 soil cuttings
2 drums w/ AOC4 purge/decon H_2O
1 drum w/ AOC5 purge/decon H_2O
6 Empty drums

S. Georgius NYOW 2/5/21

H:22 ~~to~~ gw gauging ~~data~~ 2/5/21
1230 off site

2/5/21

Rite in the Rain

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APPENDIX D
Photographic Log

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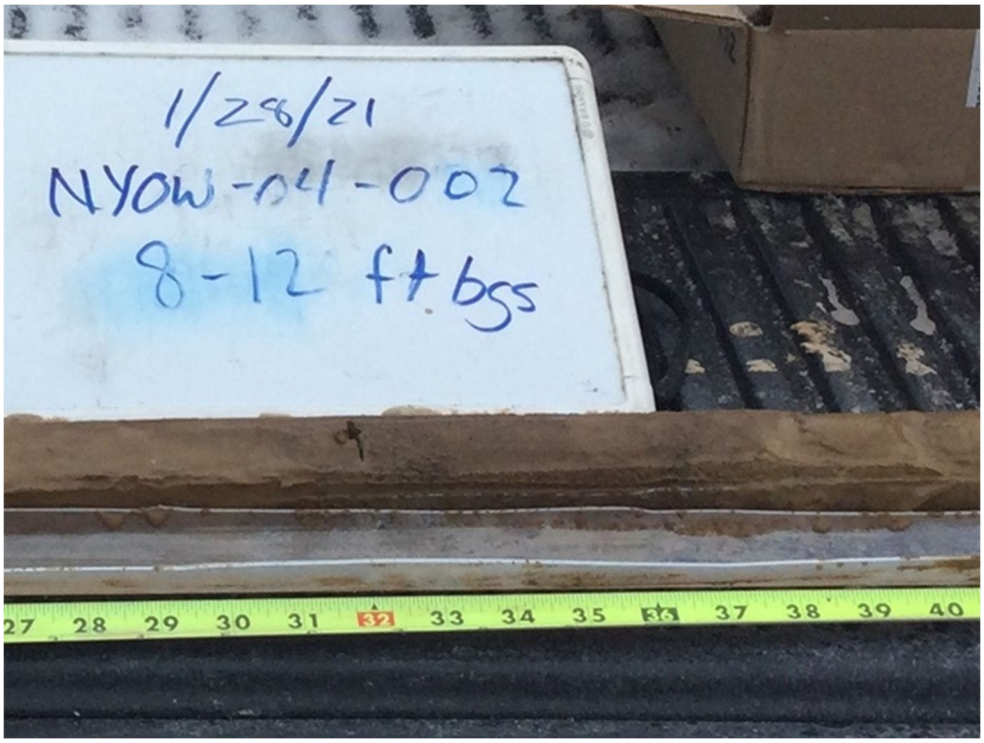
Bluestone

Photographic Log

Client Name:	Project	Site Location
CENAE	New York Ordnance Works	Baldwinsville, New York

Area:	Area of Concern (AOC) 4
Location: NYOW-04-002	
Photo ID:	001
Date: 1/28/21	
Description:	

View of AOC 4 coarse sand (shown from 10.5 to 11.5 ft bgs) at NYOW-04-002.



Area:	AOC 4
Location: NYOW-04-046	
Photo ID:	002
Date: 1/26/21	
Description:	

View of AOC 4 drilling at NYOW-04-046, facing northwest.



Photographic Log

Client Name:	Project	Site Location
CENAE	New York Ordnance Works	Baldwinsville, New York

Area:	AOC 4
Location: NYOW-04-082	
Photo ID:	003
Date: 2/2/21	
Description:	

View of AOC 4 gravelly silt with sand (shown from 14.5 to 15.5 ft bgs) at NYOW-04-082.



Area:	AOC 4
Location: NYOW-04-007	
Photo ID:	004
Date: 1/25/21	
Description:	

View of AOC 4 post-boring installation at NYOW-04-007, facing south.



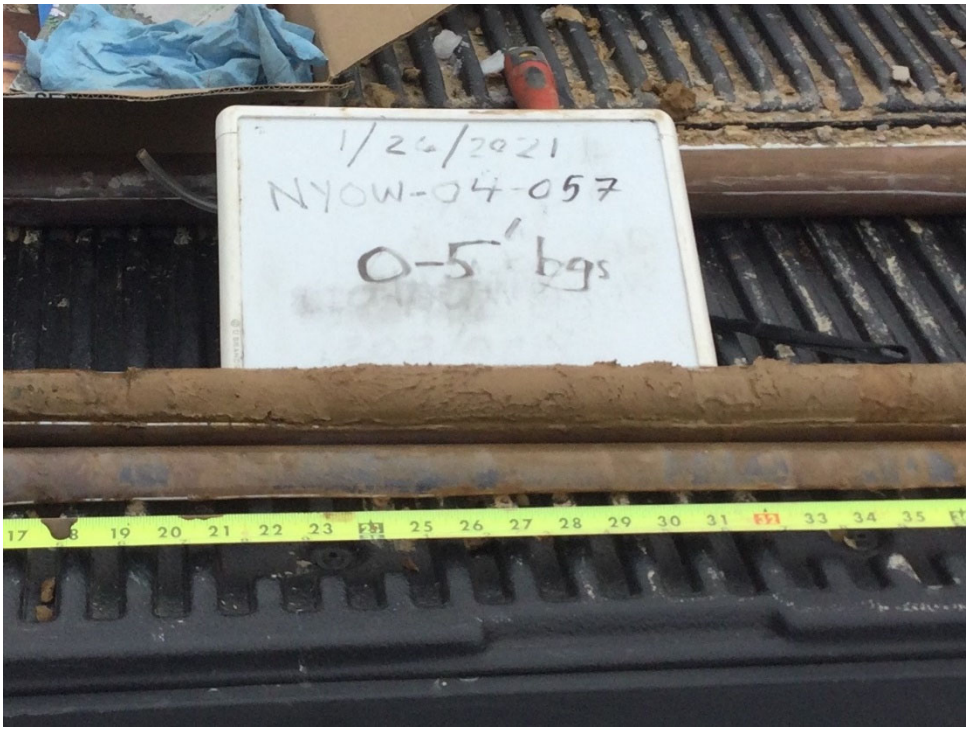
Area:	AOC 4
Location: Bunker 6	
Photo ID:	005
Date: 2/4/21	
Description: View of AOC 4 pressure washing for swallow-wort mitigation at Bunker 6, facing west.	



Area:	AOC 4
Location: Bunker 13	
Photo ID:	006
Date: 2/3/21	
Description: View of AOC 4 pulling rig up snow covered slope at Bunker 13, facing southwest.	



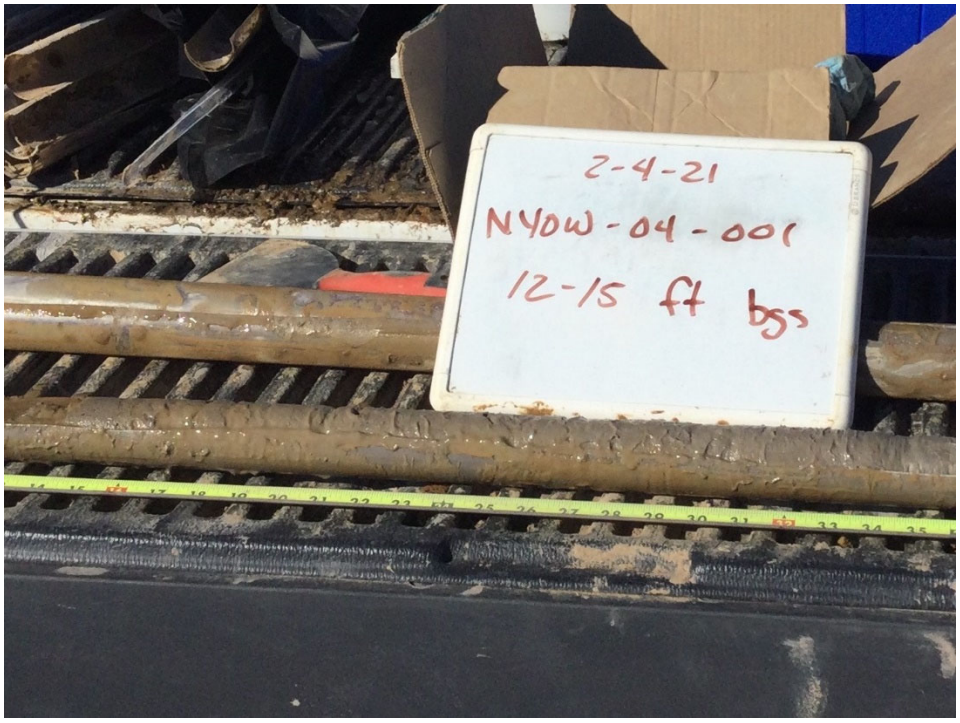
Area:	AOC 4
Location: NYOW-04-075, Bunker 14	
Photo ID:	007
Date: 2/3/21	
Description: View of AOC 4 rig staged on plastic and plywood due to swallow-wort at NYOW-04-075 Bunker 14, facing south.	

Area:	AOC 4
Location: NYOW-04-57	
Photo ID:	008
Date: 1/26/21	
Description: View of AOC 4 sandy silt (shown from 2.5 to 4 ft bgs) at NYOW-04-057.	

Area:	AOC 4
Location: NYOW-04-001	
Photo ID:	009
Date: 2/4/21	

Description:

View of AOC 4 saturated sand (shown from 12 to 14 ft bgs) at NYOW-04-001.



Area:	AOC 4
Location: Staging Area	
Photo ID:	010
Date: 1/25/21	

Description:

View of AOC 4 staging area, facing south.



Client Name:	Project	Site Location
CENAE	New York Ordnance Works	Baldwinsville, New York

Area:	AOC 4
Location: NYOW-04-003	
Photo ID:	011
Date: 2/1/21	
Description:	

View of AOC 4 steel ProCasing stickup at NYOW-04-003, facing west.



Area:	AOC 5
Location: NYOW-05-023	
Photo ID:	012
Date: 1/8/21	
Description:	

View of AOC 5 cleared access to NYOW-05-023 adjacent to coal aggregate bin, facing north.



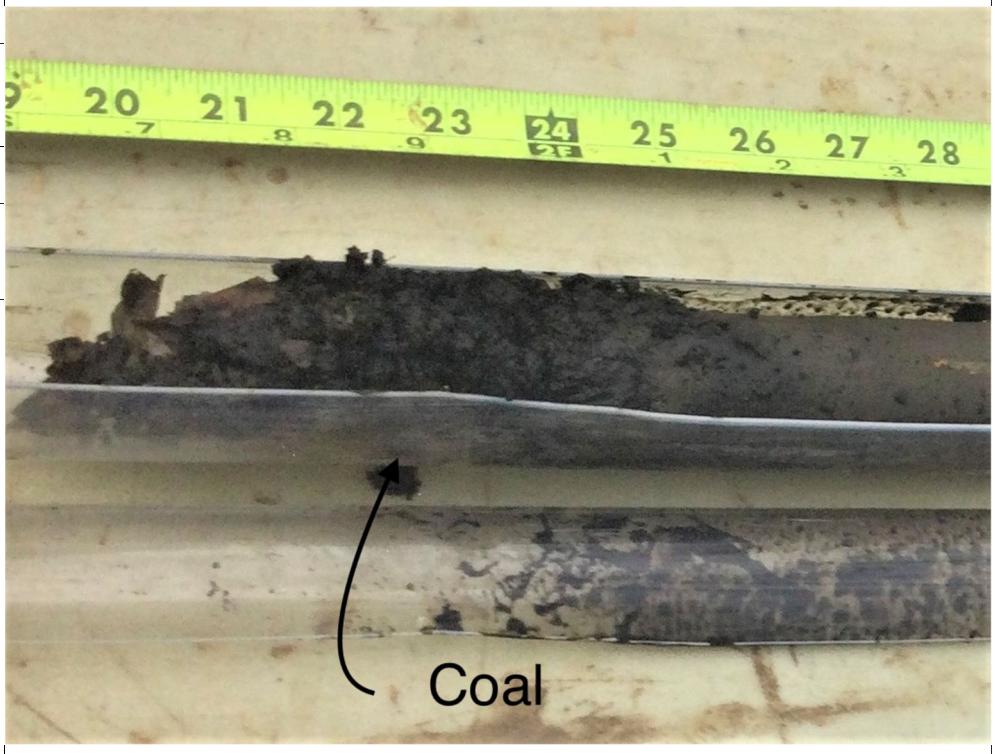
Area:	AOC 5
Location: NYOW-05-013	
Photo ID:	013
Date: 1/13/21	
Description:	

View of AOC 5 orange lenses (at NYOW-05-013 4.5 to 10 ft bgs) that are highly reactive to HCl and encountered in borings across the site.



Area:	AOC 5
Location: NYOW-05-009	
Photo ID:	014
Date: 1/7/21	
Description:	

View of AOC 5 boring location NYOW-05-009. Note surface interval (0 to 0.5 ft bgs) is comprised almost entirely of coal.



Area:	AOC 5
Location: NYOW-05-019	
Photo ID:	015
Date: 1/15/21	
Description: View of AOC 5 flush-mount well at NYOW-05-019, facing west.	



Area:	AOC 5
Location: AOC 5	
Photo ID:	016
Date: 1/6/21	
Description: View of AOC 5 Former Boiler House footprint, facing southeast.	



Area:	AOC 5
Location: N/A	
Photo ID:	017
Date: 1/6/21	
Description:	

View of AOC 5 GPR unit used by GPRS to scan for buried utilities.



Area:	AOC 5
Location: NYOW-05-002	
Photo ID:	018
Date: 1/12/21	
Description:	

View of AOC 5 NYOW-05-002 adjacent to vernal pool, facing northwest.



Area:	AOC 5
Location: N/A	
Photo ID:	019
Date: N/A	
Description:	

View of #00 sand utilized for the 4" sand pack around a well needed for silty conditions, facing west.



Area:	AOC 5
Location: NYOW-05-024	
Photo ID:	020
Date: 1/8/21	
Description:	

View of AOC 5 rig setup at NYOW-05-024, facing west. Dark surface soil is comprised mostly of coal dust.



Bluestone

Photographic Log

Client Name:	Project	Site Location
CENAE	New York Ordnance Works	Baldwinsville, New York

Area:	AOC 5
Location: NYOW-05-008	
Photo ID:	021
Date: 1/7/21	
Description:	

View of AOC 5 saturated sand interval at NYOW-05-008 from 16 to 19 ft bgs.



Area:	AOC 5
Location: NYOW-05-024	
Photo ID:	022
Date: 1/11/21	
Description:	

View of AOC 5 temporary stick-up well at NYOW-05-024, facing northwest.



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APPENDIX E
Geophysical Report AOC 5 – RETTEW

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PROPOSAL FOR MAPPING LANDFILL EXTENTS
FORMER NY ORDNANCE WORKS

BALDWINSVILLE, ONONDANGA COUNTY, PENNSYLVANIA

January 29, 2021
Revised October 1, 2021

Prepared for:

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Engineers
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Landscape Architects
Safety Consultants

January 29, 2021
Revised October 1, 2021

Michael Badeau, PE
Bluestone Environmental Group, Inc.
310 Lindenwood Drive, Suite 102
Malvern, PA 19355

RE:
Geophysical Survey for Mapping Landfill Extents
Former NY Ordnance Works, Baldwinsville, NY
RETTEW Project No. 098462002

Dear Mike:

Pursuant to our proposal dated August 26, 2020, RETTEW Field Services, Inc. has completed a geophysical survey at the above-referenced site. The goal of the survey was to detect and delineate the boundaries of a closed landfill encapsulated by soil and vegetative growth. To accomplish these goals, RETTEW performed an electromagnetic (EM) survey to detect the presence of conductive materials in the subsurface. The following report and figures describe the methods and results of the investigation.

SITE DESCRIPTION

The geophysical survey was conducted within client-designated portions of the site (see **Figure 1**) on January 13th, 2021. The survey area was approximately one acre of lightly wooded ground with sporadic areas of heavy brush and standing water, which were completely inaccessible. Where the site could be accessed, the use of time domain EM (e.g., Geonics EM-61) and ground penetrating radar (GPR), which are mounted on wheeled carts, was precluded. Hand-carried frequency domain EM was employed in their stead.

FREQUENCY DOMAIN EM PRINCIPLES

Frequency domain EM instruments measure the electrical conductivity of subsurface materials by using a transmitter coil to generate an electromagnetic field which drives an electrical current in the ground. A receiver coil at a fixed separation from the transmitter is tuned and oriented to be insensitive to the transmitted field, and therefore measures only a secondary electromagnetic field generated by the subsurface electrical current. The strength and orientation of this field can be used to accurately estimate the electrical conductivity (terrain conductivity) and/or relative metallic content (inphase response) of the subsurface materials.

The electrical currents in the ground driven by the EM transmitter are conducted primarily through soil moisture (see **Appendix A**). Therefore, measured terrain conductivities are primarily sensitive to the porosity of earth materials, and the electrolyte content of the moisture itself (Ibid.) This makes frequency-domain EM particularly well-suited to delineating fill areas where there may be poorly compacted (high porosity) materials with soil moisture rich in leached electrolytes (see **Appendix B**).

In addition, some EM instruments (such as the Geonics EM-31 MKII, which was used for this survey) can

record the phase shift between the primary (transmitted) electromagnetic field and the secondary field from electrical currents in the subsurface. These "inphase" data are a measure of the metallic content of the materials near the instrument. Therefore, where interference from metallic structures or debris (e.g., utilities, fences, etc.) is expected, simultaneous recording of terrain conductivities and inphase data allows identification of stations where the terrain conductivity reflects the presence of metallic interference, rather than soil or rock conditions or features (see Appendix B).

Based on the design of the EM-31 MKII (12.14-foot intercoil spacing and 10kHz operating frequency), the effective penetration depth or sensitivity peaks at a depth of about 5 feet, with 80% of the sensitivity above about 18 feet. For physical reasons explained in **Appendix C**, the single-frequency EM-31 design has been the state-of-the-art for frequency domain EM for almost 40 years.

EM-31 FIELD PROCEDURE

A Geonics EM-31 MKII terrain conductivity meter with vertical dipole coil orientation was used to collect terrain conductivity readings at approximately one-foot stationing along EM survey profiles spaced approximately 5-10 feet apart in accessible areas of the site (see magenta dots in **Figure 1**). At each survey station, terrain conductivity (in millimhos/meter or mmho/m) and inphase response values (in parts per thousand or ppt) were automatically digitally recorded using an Allegro Field Computer. Note that in vertical dipole mode, the instrument is less sensitive to material at the ground surface and has peak sensitivity to material at a depth of approximately five feet. Below five feet, the sensitivity diminishes approximately logarithmically. Approximately 80 percent of the signal originates at depths less than 25 feet. Therefore, the terrain conductivity or inphase response measured by the EM-31 in vertical dipole mode represents primarily subsurface electrical properties at a depth of five feet (plus or minus) with little contribution from material at the ground surface, and moderate (and diminishing) contribution from materials at a depth of approximately 25 feet.

Location control was maintained using a Geode global navigation satellite system (GNSS) receiver networked to the Allegro Field Computer. The recorded GPS positions were collected in real time with a WAAS (Wide Area Augmentation Service) signal supplying real-time differentially corrected data directly to the Allegro Field Computer. The resulting differential GPS (DGPS) positions have an accuracy of better than 2 feet.

The EM inphase (metallic content) data – in parts per thousand, or ppt – were contoured using the minimum curvature gridding routine in SURFER by Golden Software and are displayed on **Figure 2**. The inphase red/yellow color contours represent increasing metallic response. The absence of metal is represented in green. The EM-31 terrain conductivity data were similarly contoured on **Figure 3**. The terrain conductivity blue to yellow to red indicates increasing conductivity responses.

RESULTS

There were localized, measurable metallic responses in the EM-31 inphase data at several locations in the survey area. These areas were noted during the survey to have surficial metallic debris (paint cans, tire rims) and at one location a buried steel drainpipe (annotated on **Figure 2**). Locations of elevated metallic response coincide with locations of high terrain conductivity (annotated on **Figure 3**). Apart from the areas impacted by surficial metallic interference, the site shows slightly high, but consistent (for saturated soil) readings of terrain conductivity. There is a topographic trend to the data, whereas higher elevations to the east show slightly higher conductivities than the lower elevation area to the west. This correlates with

soil map data showing soil type differences across these regions, illustrated on **Figure 3**. There is no indication from the EM-31 survey that this area contains exotic fill materials, buried metallic objects, or the presence of dissolved salts/solids in the soils typically associated with landfills.

LIMITATIONS

The survey described above was completed using standard and/or routinely accepted practices of the geophysical industry, and the equipment employed represents, in RETTEW's professional opinion, the best available technology. RETTEW does not accept responsibility for survey limitations due to inherent technological limitations or unforeseen site-specific conditions. We will notify you of such limitations or conditions, when they are identifiable.

We have enjoyed and appreciated the opportunity to have worked with you. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Robert J. Krause
Senior Geophysicist

Felicia Kegel Bechtel, MSc, PG
Director of Geophysics

Enclosures
Figure 1: EM-31 Data Coverage Map
Figure 2: Inphase Response Contour Map
Figure 3: Terrain Conductivity Contour Map
Appendix A: Geonics Technical Note 5
Appendix B: Geonics Technical Note 6
Appendix C: Geonics Technical Note 30

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ENCLOSURES

N

1157200
1157150
1157100
1157050
1157000
1156950
1156900

895000 895050 895100 895150 895200 895250 895300

Geophysical Map Legend

- EM-31 Station
- Well Location
- Metallic Drainage Pipe

Notes:

Basemap from Nearmap.
GPS locations from Juniper Systems Geode.
EM-31 data collected using Geometrics MKII EM-31.

Scale (ft)

0 20 40 60 80

Figure 1: EM-31 Data Coverage Map

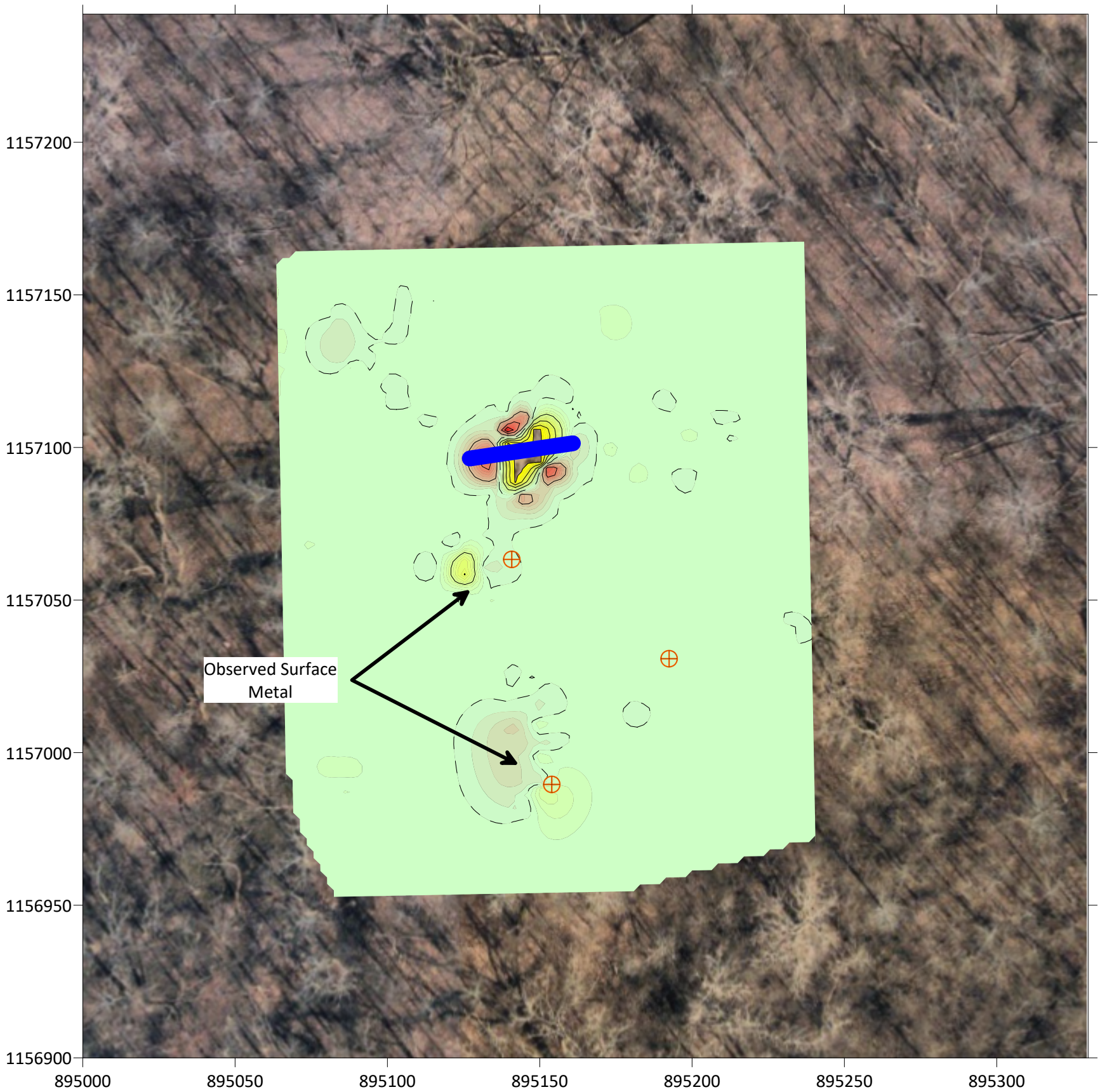
FORMER NY ORDNANCE WORKS

BALDWINSVILLE NEW YORK

RETTEW Field Services, Inc.
3020 Columbia Avenue, Lancaster, PA 17603
Phone 1-800-738-8395

SURVEY DATE:	01/13/2021
RETTEW No.:	089462002
REVIEWED BY:	FKB
DRAWN BY:	RJK
REVISION DATE:	01/29/2021
SCALE:	1 inch = 40 feet
FIGURE NO.	1 of 3

N



Increasing Metallic Content (ppt)

-20 -16 -12 -8 -4 0 4 8 12 16 20

Notes:

Basemap from Nearmap.
GPS locations from Juniper Systems Geode.
EM-31 data collected using Geometrics MKII EM-31.

Geophysical Map Legend

⊕ Well Location

Metallic Drainage Pipe

Scale (ft)

0 20 40 60 80

Figure 2: Inphase Response Contour Map

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SURVEY DATE: 01/13/2021
RETTEW No.: 089462002
REVIEWED BY: FKB
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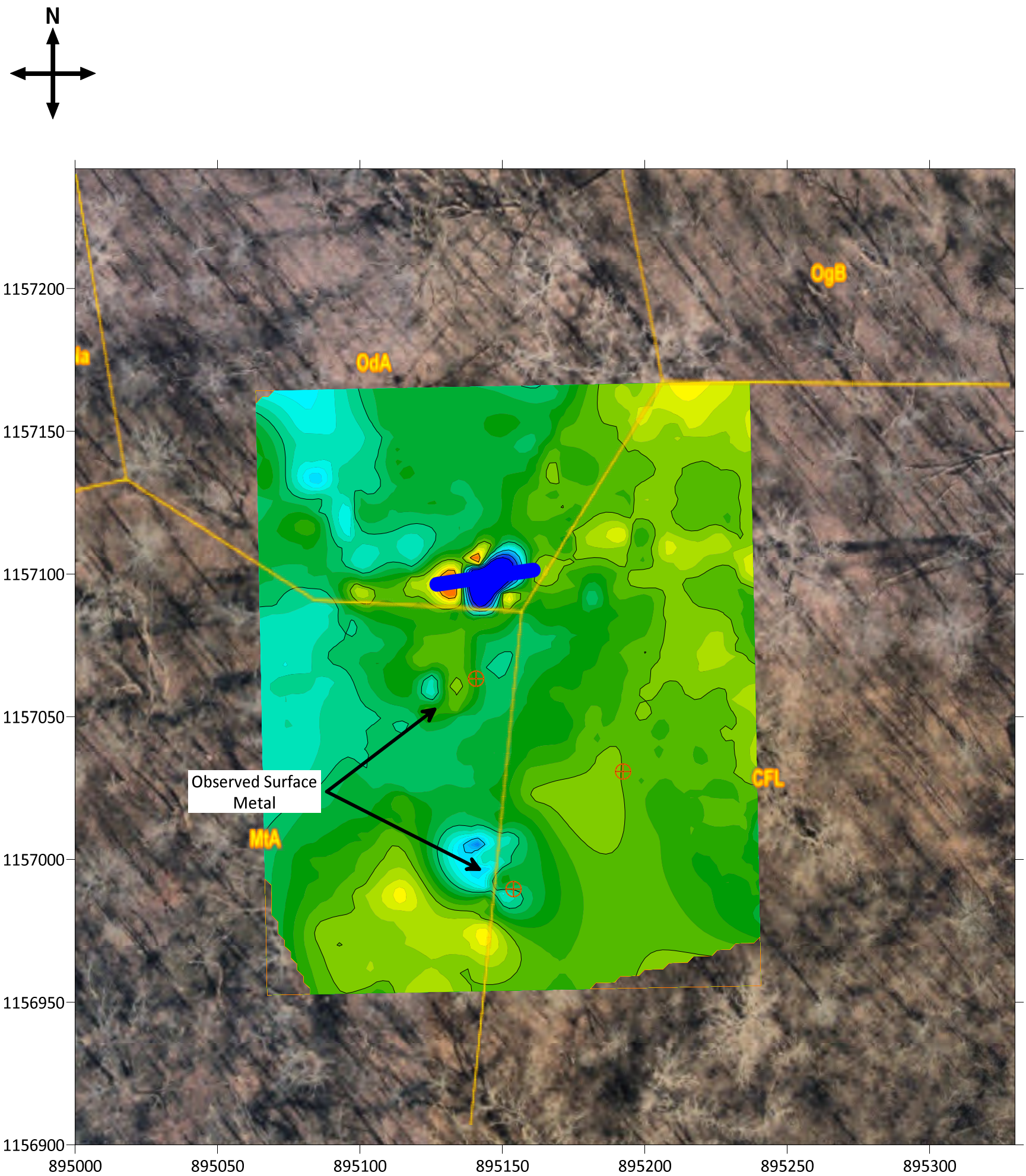
REVISION DATE: 01/29/2021
SCALE: 1 inch = 40 feet
FIGURE NO. 2 of 3



EM-31 Terrain Conductivity (mmhos/m)

Site "Normal"

Low — Elevated

0 4 8 12 16 20 24 28 32 36 40

Notes:

Basemap from Nearmap.
GPS locations from Juniper Systems Geode.
EM-31 data collected using Geometrics MKII EM-31.
Soil map from USDA Web Soil Survey application.

Geophysical Map Legend

⊕ Well Location

Metallic Drainage Pipe

Scale (ft)

0 20 40 60 80

Figure 3: Terrain Conductivity Contour Map

FORMER NY ORDNANCE WORKS

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RETTEW

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SCALE:	1 inch = 40 feet
FIGURE NO.	3 of 3

APPENDIX A
Geonics Technical Note 5

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Technical Note TN-5

ELECTRICAL CONDUCTIVITY OF SOILS AND ROCKS

J.D. McNEILL

October, 1980

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I. INTRODUCTION

It was near the beginning of this century that Conrad Schlumberger first employed the technique of mapping sub-surface geology by injecting electrical currents into the ground and mapping the resulting potential field distribution. Since that time measurement of terrain resistivity has been applied to a variety of geological problems. A partial list of applications includes the determination of rock lithology and bedrock depth; the location and mapping of aggregate and clay deposits; mapping groundwater extent and salinity; detecting pollution plumes in groundwater; mapping areas of high ice content in permafrost regions; locating geothermal areas; mapping archaeological sites, etc.

In many instances resistivity mapping provides definite geological information; however there are also cases where the results are uninterpretable since the "geological noise" is too high. A limitation of resistivity surveying is that the actual value of terrain resistivity itself is seldom diagnostic. As a result of this ambiguity we generally examine the variations of resistivity, either laterally or with depth, to outline the geological features of interest. But a problem arises in that conventional surveys are time-consuming to carry out and the area actually surveyed is often smaller than one might wish in order to fully ascertain the background against which the anomalous feature is to be defined. Furthermore, although conventional resistivity techniques sense to a characteristic depth (determined by the interelectrode spacing) resistivity inhomogeneities much smaller than that depth can, if they are located near the potential electrodes, yield large errors in the measurement and thus a noisy survey profile.

For these reasons application of resistivity surveys to engineering problems is not as common as it might be, particularly in North America. Such surveys have achieved success in Europe and are used more routinely.

It was an awareness both of the potential of resistivity measurements for solving geological problems and equally of some of the drawbacks of conventional resistivity mapping which lead Geonics Limited to develop two new lines of instrumentation employing electromagnetic techniques to measure terrain conductivity. In the first of these a sinusoidally varying magnetic field electromagnetically induces currents in the ground in such a manner that their amplitude is linearly proportional to the terrain conductivity (reciprocal of resistivity). The magnitude of these currents is determined by measuring the magnetic field which they in turn generate. Through the use of electromagnetic techniques, ground contact is avoided and with these patented instruments it is possible to map terrain conductivity virtually as fast as the operator(s) can walk; furthermore the sample volume is averaged in such a manner as to yield excellent resolution in conductivity. Two instruments have been developed by Geonics to cover the range of depths generally useful for engineering geophysics: (i) the EM31, one-man portable, has an effective penetration depth of 6 meters and (ii) the EM34-3, two-man portable, has stepwise selectable depths from 7.5 meters to 60 meters.

In the second approach the current flowing in a loop situated on the ground is abruptly terminated, inducing eddy currents in the ground which diffuse away from the transmitter loop in a manner controlled by the ground conductivity. In this case the dispersal of the currents is determined by measuring the transient decay of their magnetic field. Based on this principle, the Geonics EM37 can be used to determine the electrical properties of the earth to depths of several hundred meters.

These devices are assisting in the solution of many geological problems. With the renewed interest in resistivity it has become apparent that there is a requirement for a short note which discusses, from the point of view of survey interpretation, the various factors that influence terrain resistivity. For example, typical questions raised include (1) When are gravels more resistive than finer material? (2) What is the influence of the depth to water table? (3) It rained heavily last week; will this affect the measurements? (4) What are typical resistivities for the following soil types?, etc., etc.

By describing the various factors that control the electrical conductivity/resistivity of soils and rocks under typical in-situ conditions this note will attempt to provide the technical background against which these questions can be answered and to thus give the operator greater confidence in his survey interpretation. The emphasis throughout this technical note is on those factors that influence the near-surface ground resistivity, particularly of soils.

The various topics are dealt with in the following sequence.

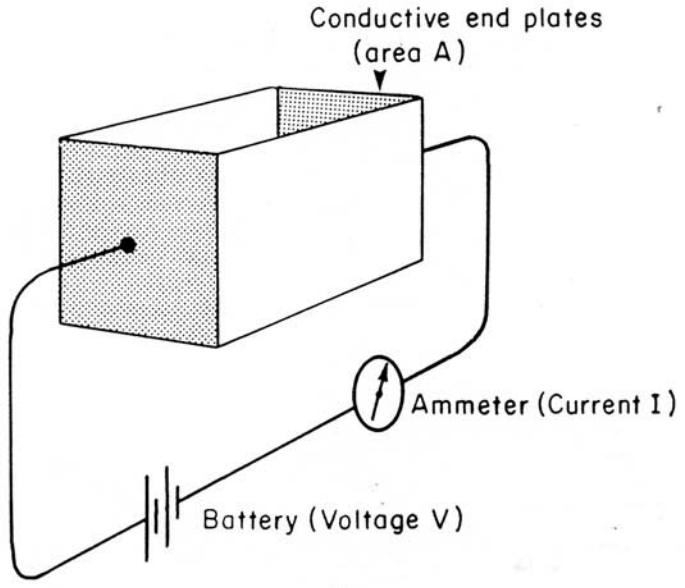
Section II: definition of conductivity & resistivity
Section III: description of relevant physical properties of soils and rocks
Section IV: relation of physical properties to the electrical conductivity
Section V: discussion of conventional resistivity measurements of soils in different climatic zones.

As mentioned above, this technical note is directed towards the user. Many readers will be familiar with the physical properties of soils and we ask their indulgence. None of the material on the electrical properties of soils is original; some has been taken verbatim from the references. However the compilation has been derived from many sources and we hope that it will prove useful.

II. RESISTIVITY/CONDUCTIVITY

Basically the electrical resistivity/conductivity of a substance is a measure of the difficulty/ease with which an electrical current can be made to flow through it. Suppose that we construct a tank with insulating sides and two conductive end plates as shown in Figure 1. The end plates are connected to a battery through an ammeter with which we measure the current flow through the sample. If the tank is empty there is of course no path by which the current can flow from one end plate to the other and the ammeter reads zero.

Suppose we fill the tank with a mixture of clean gravel and tap water. The ammeter will read a finite current and, depending on



RESISTIVITY (ρ)

$$\rho = \frac{R\,A}{L} \text{ ohm·metres}$$

where $R = \frac{V}{I}$ ohms

CONDUCTIVITY (σ)

$$\sigma = \frac{G\,L}{A} \text{ mhos/meter}$$

where $G = \frac{I}{V}$ mhos

FIGURE 1. Resistivity/conductivity tank.

various parameters to be discussed in Section IV, might indicate a current flow of a few thousandths of an ampere i.e. a few milliamperes, for a voltage of one volt. If the ammeter reads two milliamperes the electrical resistance of the material in the tank, given by the ratio of the voltage divided by the current, is 500 ohms.

If we now fill a number of different rectangular tanks, of different dimensions, with the same mixture we would find that the electrical resistance is proportional to the length of the tank and inversely proportional to the area of the conductive plate electrodes. The constant of proportionality, a property of the mixture only, independent of the tank dimensions, is defined as the electrical resistivity. In the MKS system it has the units of ohm-meters and is the electrical resistance measured on a cubic sample whose dimensions are all one meter. In the CGS system of units the resistivity is defined as the resistance across two opposite faces of a cubic sample one centimeter on each side and the units are ohm-centimeters. From the defining relation we see that, given the resistivity in ohm-centimeters, we must divide by 100 in order to get the resistivity in ohm-meters.

Suppose that we empty our tank (now assumed to be one meter on a side) and fill it with a mixture of clay saturated with water. We might find that the ammeter read a few tenths of an ampere, perhaps as much as half an ampere. The resistance would then be two ohms, the resistivity two ohm-meters. The range of resistivities displayed by unconsolidated materials at temperate ambient temperatures usually lies between one ohm-meter and one thousand ohm-meters; the resistivity of rocks can vary from a few tens of ohm-meters to as high as 100,000 ohm-meters, discussed in further detail in Section IV.

The reciprocal of the electrical resistivity of our sample is defined as the electrical conductivity. In the MKS system the unit of conductivity is the mho per meter and a resistivity of one ohm-meter exhibits a conductivity of one mho per meter, 100 ohm-meters is equivalent to a conductivity of 0.01 mhos per meter, etc. The electromagnetic instruments actually measure terrain *conductivity* rather than *resistivity* and for this reason much of the remainder of this technical note will be concerned with the conductivity of various terrain materials rather than the resistivity.

It was stated above that a resistivity of 100 ohm-meters corresponds to a conductivity of 0.01 mhos per meter. To avoid the inconvenience of having zeros immediately following the decimal point all conductivities will be expressed in millimhos per meter: a conductivity of .01 mhos per meter corresponds to 10 millimhos per meter, etc. This has the advantage that the range of resistivities from 1 to 1,000 ohm-meters is covered by the range of conductivities from 1,000 to 1 millimhos per meter and such numbers are easily handled. Table 1 lists the conversion from resistivity and conductivity in various units to conductivity in millimhos per meter.

In the experiments described above a direct current was employed. Had we used an alternating current and varied the frequency we might have discovered that the electrical properties of the sample varied with frequency. In reality soils and rocks are complex substances in which there are many (some poorly understood) mechanisms which govern the mode of current flow through the sample [1–5].

TABLE 1. Resistivity/conductivity unit conversion factors

mhos/meter × 1000	→	millimhos/meter
$\frac{1000}{\text{ohm-meters}}$	→	millimhos/meter
$\frac{100{,}000}{\text{ohm-centimeters}}$	→	millimhos/meter
$\frac{\text{cgs electrostatic units}}{9 \times 10^6}$	→	millimhos/meter

Note: 1 Siemen (S) = 1 mho

Fortunately, for materials with conductivity of the order of one to 1,000 millimhos per meter the electrical properties which control the current flow are relatively independent of frequency and the DC or low frequency conductivity measured with conventional resistivity equipment will be essentially the same as that measured using low frequency electromagnetic techniques.

Finally it should be noted that measurement of the electrical conductivity or resistivity of geological samples is, in reality, a very difficult procedure requiring much more complex equipment than the simple tank referred to above.

III. FACTORS AFFECTING TERRAIN CONDUCTIVITY

Most soil and rock minerals are electrical insulators of very high resistivity. However on rare occasions conductive minerals such as magnetite, specular hematite, carbon, graphite, pyrite and pyrrhotite occur in sufficient quantities in rocks to greatly increase their overall conductivity. This note assumes that such minerals are absent.

In general the conductivity is electrolytic and takes place through the moisture-filled pores and passages which are contained within the insulating matrix. The conductivity is therefore determined for both rocks and soils by

(1) porosity; shape and size of pores, number, size and shape of interconnecting passages
(2) the extent to which pores are filled by water i.e. the moisture content
(3) concentration of dissolved electrolytes in the contained moisture
(4) temperature and phase state of the porewater
(5) amount and composition of colloids

Since the constituents, structure, and included moisture of soil or rock are of great importance in determining the conductivity, this section will discuss the various physical and chemical properties in sufficient detail to illustrate how they affect the material conductivity.

III. 1. Soil Constituents

Soils consist basically of four components namely (i) mineral material (ii) organic material (iii) water and (iv) gases.

Figure 2 shows schematically the relative proportion of these components in an unsaturated loam soil (to be defined later). The illustration refers to a temperate zone soil; for humid region soils about 45% of the solid space may be occupied by clay minerals and 5% by organic matter.

The mineral fraction of a soil can be extremely variable, however some generalizations can be made based on grain size [6]:

sand size range – mostly quartz, small amounts of feldspar and mica present, all grains coated to some extent with iron and aluminum oxide (the rusty reddish-brown colour observed is due to the iron).

silt size range – quartz still dominant, less feldspar and mica than in the sand fraction, more iron and aluminum

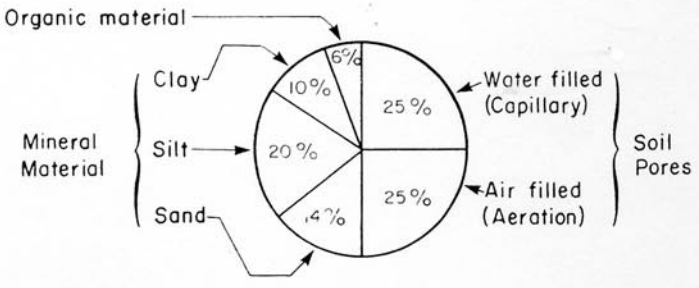


FIGURE 2. The volumetric composition of a loam soil when excess water has been removed. On a weight basis the percentage composition of the dry soil would be: organic matter 4%, clay 22%, silt 44% and sand 30% (after L.R. Webber [6]).

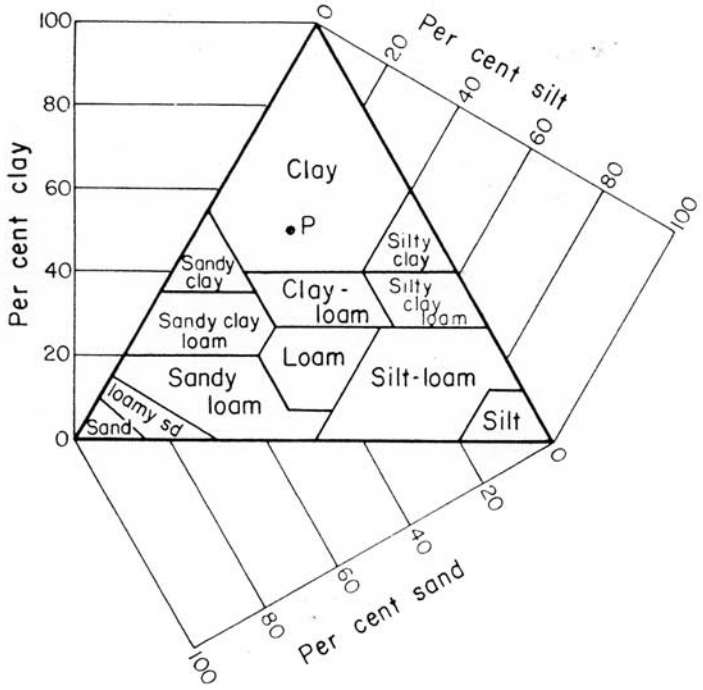


FIGURE 3. U.S. Department of Agriculture textural classification triangle with axes added. The point P represents a clay (soil) containing 50 per cent clay, 20 per cent silt, and 30 per cent sand (after D. Kirkham [7]).

oxides in the form of coatings due to the greater particle surface area on which the coatings may reside.

clay size range – finely divided quartz, feldspar, mica, iron and aluminum oxides, all of which appear in the coarser part of the clay fraction (0.002 millimeters – 0.001 millimeters in diameter); the finer part (less than 0.001 millimeters) is colloidal and consists mainly of layer silicates with smaller amounts of iron and aluminum oxides.

As indicated above soils are classified on the basis of texture or grain size independently of the mineralogical content of each particle size component. Sand is defined as particles with diameters between 0.05 millimeters and 2 millimeters, silt has diameters between 0.002 millimeters and 0.05 millimeters and clay has diameters less than 0.002 millimeters. Figure 3 shows the classification triangle for various types of soil and is useful as it allows an estimate of the clay content which often consists essentially of clay minerals which affect the soil conductivity.

The minerals in the sand and silt fractions of the soil are electrically neutral and are generally excellent insulators. Completely dry clay is also an insulator but the introduction of moisture changes the situation radically. Clay consists of microscopically fine particles

TABLE 2. Exchange capacity of common clays (after Keller and Frischknecht [5])

Clay	Exchange Capacity
Kaolinite	3 to 15 m-equiv/100 g
Halloysite . $2H_2O$	5 to 10
Halloysite . $4H_2O$	40 to 50
Montmorillonite	80 to 150
Illite	10 to 40
Vermiculite	100 to 150
Chlorite	10 to 40
Attapulgite	20 to 30

TABLE 3. The cation exchange capacity (CEC) and colloid content of five soils of different textures (after L. R. Webber [6]).

Soil Texture	Organic Matter %	Clay %	CEC* me/100 g
Sand	1.7	7	6.3
Sandy loam	3.2	13.2	13.7
Loam	4.9	16.8	20.2
Silt loam	5.4	18.4	24.0
Clay loam	5.5	31.2	27.2

*The cation exchange capacity of a soil is expressed in terms of milliequivalents per 100 grams of soil (meq/100 g). A milliequivalent is defined as 1.0 milligram of hydrogen or the amount of any other element that will combine with or displace it. The milliequivalent weight of any element may be found as follows:

$$\frac{\text{atomic weight of element}}{\text{valence of element} \times 1000} = \text{milliequivalent weight}$$

exhibiting a sheet-like structure, for which reason clays are often called "layer silicates". Composed of stable secondary minerals that have formed as a result of weathering of primary minerals such as feldspar, mica, etc, the particles are so fine-grained that they are described as micro-crystals.

Their crystalline structure is such that, as a result of crystal imperfections, the surface appears to be negatively charged [5]. During the formation of the clay through weathering, positive charges (cations) are adsorbed to the surface. These cations (typically Ca, Mg, H, K, Na, NH_3) are loosely held to the surface and can subsequently be exchanged for other cations or essentially go into solution should the clay be mixed with water. For this reason they are called exchangeable ions and the cation exchange capacity (CEC) of the soil is a measure of the number of cations that are required to neutralize the clay particle as a whole i.e. the weight of ions in milliequivalents adsorbed per 100 grams of clay.

The exchange capacities of some common clays are given in Table 2 and of some different soil textures in Table 3. It is seen from Table 3 that the cation exchange capacity increases with clay content and from Table 2 that this will depend on the type of clay.

Clay minerals are not the only materials which have cation exchange capacity; indeed any fine-grained mineral including quartz displays this property. The special significance of clay in this respect is that, because of the extremely small particle size, the surface area per unit volume of clay is very large and a great many ions are adsorbed. It will be seen in the next section that these adsorbed ions can contribute appreciably to the soil conductivity which thus becomes a function of the clay content.

The organic matter includes the remains of plant and animal life in the soil. The end products of decay accumulate as a blackish, finely-divided colloidal substance known as humus [6] which has large surface area per unit volume, takes up large amounts of water and can develop a negative electrical charge of varying intensity. Little is known of the effects of such colloidal characteristics on the electrical conductivity of humus but they may be significant.

The important influence of soil moisture on the electrical conductivity of soils is discussed at length in a later section.

The direct effect of soil gases on conductivity is negligible, however the indirect effect of CO_2 is important and is also described in a later section.

III. 2. Formation of Soils [8] and Soil Profiles [9]

Soils are the result of mechanical, chemical, and biological weathering processes acting on surficial materials in such a way as to grossly alter their physical and chemical properties. In the process of decomposition of parent materials new and stable substances such as clay minerals and humic materials are formed.

As an example of the weathering process consider the chemical

weathering of orthoclase feldspar (an important constituent of granites and other intrusive rocks) to kaolinite, a clay.. Atmospheric carbon dioxide is slightly soluble in water so as to form carbonic acid.

$$\underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{Water}}{H_2O} \rightleftharpoons \underset{\text{Carbonic acid}}{H_2CO_3} \qquad (1)$$

A small amount of the carbonic acid dissociates so as to produce a hydrogen ion and a bicarbonate ion

$$H_2CO_3 \rightleftharpoons \underset{\text{Hydrogen ion}}{H^+} + \underset{\text{Bicarbonate ion}}{HCO_3^-} \qquad (2)$$

The bicarbonate ion and water combine with the feldspar to form kaolinite, dissolved silica, free potassium ions and free bicarbonate ions

$$\underset{\text{Orthoclase feldspar}}{2K\,Al\,Si_3O_8} + 2H^+ + 2HCO_3^- + H_2O \longrightarrow \qquad (3)$$

$$\underset{\text{Kaolinite}}{Al_2Si_2O_5(OH)_4} + 4\,\underset{\text{Silica}}{SiO_2} + \underset{\text{Potassium ion}}{2K^+} + \underset{\text{Bicarbonate ion}}{2HCO_3^-}$$

The formula for kaolinite can also be written in the following manner

$$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$$

to show that it consists of alumina, silica, and water.

These equations illustrate three important points: (i) The potassium and silica produced by dissolving the feldspar appear as dissolved material. Note that the potassium, converted to a potassium ion, goes into solution and may or may not be present depending on the drainage. (ii) Water is used up in the reaction; it is absorbed into the kaolinite structure. (iii) Hydrogen ions are used up in the reaction and the solution becomes more basic (i.e. less acidic) as the reaction proceeds. All of the reactions described herein affect the electrical properties of the soil by varying either the clay content or the ionic type and concentration in the soil water.

Now let us examine how various factors control this weathering process. The production of soil is a positive feedback process in that once a thin veneer of soil forms, the parent material weathers more rapidly, and more soil is formed. Suppose for example that we have a thin layer of soil on granite. This layer retains moisture which supplies both water that converts carbon dioxide to carbonic acid and water that is hydrated to form kaolinite. Other acids present in the soil contribute additional supplies of hydrogen ion to convert more feldspar to kaolinite as the equations indicate. Plant roots and the process of bacterial decay produce quantities of carbon dioxide to yield more carbonic acid (the amount of carbon dioxide in soil can be as much as ten times greater than that of rainwater, which makes soil water a particularly efficient dissolver of feldspars).

The speed of weathering is a function of climatic type since the rate at which chemical reactions proceed increases with temperature and, more importantly, biological process also proceed faster with higher temperature. Furthermore, since water is needed for the weathering reactions and vegetation grows more lushly in humid climates weathering is most intense in tropical climates which are wet and warm. The surface water resulting from rainfall percolates downwards through the soil, which is more or less permeable, and as it passes reacts chemically with minerals within the soil. The higher the rainfall the more water is available and the more the

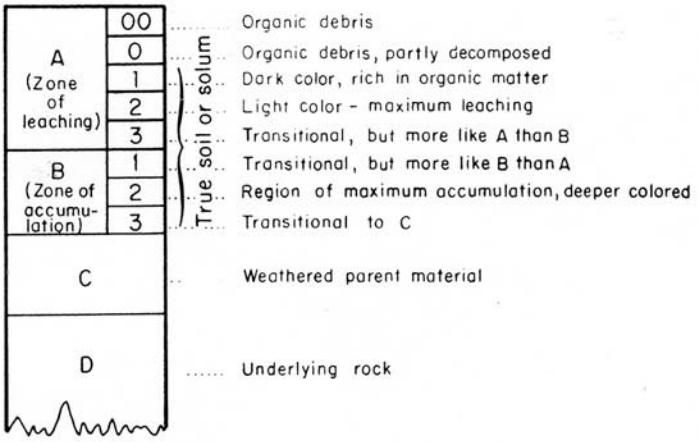


FIGURE 4. Normal or zonal soil profile (after G.B. Maxey [9]).

minerals will react with the undersaturated water. The longer the time the water percolates through, the more time it has to react chemically and again the higher the temperature, the faster the reaction rates.

As a result of these factors tropical soils tend to be thick. Well drained soils tend to be devoid of most unstable minerals. Arid soils contain a variety of minerals. The clay minerals which form are a function of temperature and humidity and there is a tendency for different clays to form in the various climatic belts [10].

As long as there is rainfall and the temperatures are not too low there is a tendency for soils to form a layered structure. In general three different regions or horizons are recognized as we move down through the soil profile, usually designated by the letters A, B, and C. These horizons can vary in thickness from a centimeter to several meters or tens of meters and differ in colour, texture, structure, and other properties.

The chief characteristics of a profile are illustrated in Figure 4. The A horizon, closest to the surface, is the most intensely weathered and has the soluble minerals leached out and most other minerals altered. This layer usually contains much humus, which contributes to its dark colour. Structurally it is friable, granular, or platey. When either friable or granular this horizon is permeable, much more so than the underlying B horizon which is generally a zone of clay accumulation, some of which was formed in-situ and some of which was transported downwards from the A zone by the soil water. The B horizon generally displays a vertical structure in widely or closely spaced joints and it is this horizon that exerts the greatest influence on water movement vertically downwards. When the clay is dry these joints allow rapid downwards movement but when the clay is wet it expands and can close the joints to make the layer impermeable, which may in turn cause the A horizon to become saturated for appreciable periods of time. The C horizon consists of less-weathered parent material and is usually relatively permeable [9].

This layering, with its relatively clay-free A horizon and clay-rich B horizon, greatly influences the vertical profile of electrical conductivity which will be seen to be a function of both clay and water content.

III. 3. Soil Moisture

It was noted at the beginning of this section that the electrical conductivity of soils and rocks was primarily electrolytic and took place through the moisture filled pores and passages which lie within the matrix of insulating minerals. For this reason a knowledge of the way in which soil moisture is distributed in typical terrain is important in understanding terrain conductivity.

When rainwater or irrigation falls on the surface of the soil a fraction runs off directly as surface runoff and the remainder percolates directly into the soil. A fraction of this moisture is retained by the soil, the remainder moves vertically downwards under the force

of gravity until it reaches the water table. In a soil moisture profile it is generally possible to distinguish four stages of moisture occurrence depending on the relative continuity of the moisture films across the soil grains [11] as shown in Figure 5. In the uppermost region we have the pendular state in which the pore space is largely filled with water vapour. The actual liquid water exists only in very small isolated rings around the grain contacts and a continuous path does not exist between the various moisture occurrences. At greater depth we have the funicular stage in which the pendular rings have coalesced to the point where the liquid films have just become continuous throughout the pore space and entirely enclose or encapsulate the vapour phase. Across the sample the moisture path is now continuous. Again further down, in the capillary stage, all pore spaces are occupied by liquid but the liquid pressure within the pores is less than the total pressure caused by gravity since capillary action within the fine pore spaces has caused the moisture to ascend into these pore spaces. Capillary rise, determined effectively by pore size and type, seldom exceeds several meters. Finally we arrive at the phreatic surface (water table) at which the atmospheric pressure is in equilibrium with the hydrostatic pressure. All pores within the phreatic surface are completely filled with liquid under hydrostatic pressure and this is the region of groundwater, also known as the zone of saturation. The three regions above the phreatic surface are collectively referred to as soil moisture, suspended water, vadose water, or zone of aeration.

Figure 5 also illustrates typically the fraction of pore space filled by liquid in the different zones.

A term that is often used in discussing the moisture content of soils is field capacity. Suppose that the water table is very deep below a surface soil of homogenous nature. After a heavy rainfall or irrigation the moisture content reaches a quasi-equilibrium condition in one to three days. As the water percolates down through the soil on its way to the water table capillary forces will retain a certain fraction of the moisture in the small pore spaces. This is the field capacity and it is the moisture content of the soil after the gravitational water has been removed by deep seepage.

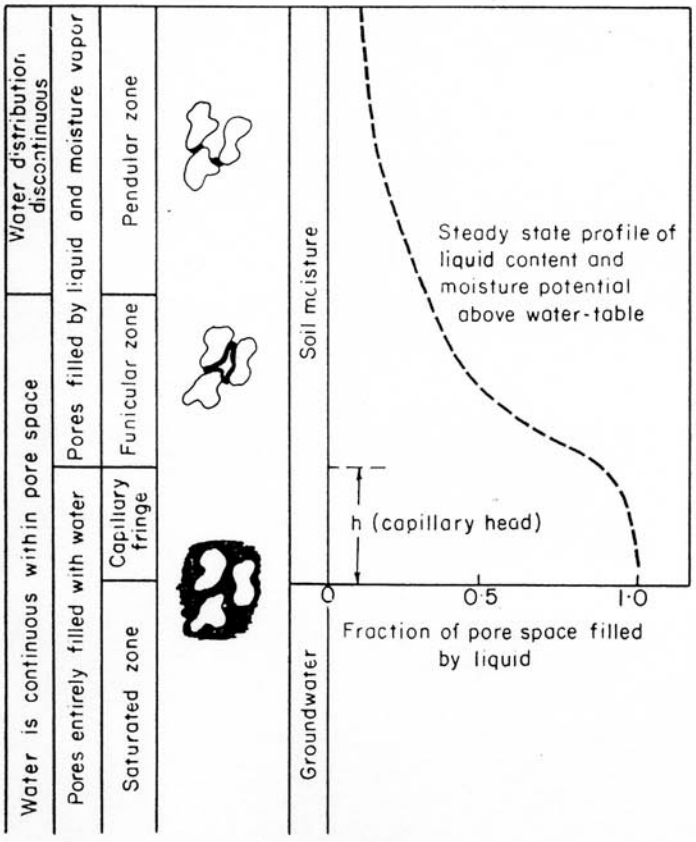


FIGURE 5. Liquid occurrence in soils (after P. Meyboom [11]).

TABLE 4. Permeability of soils (after D. K. Todd [12])

SOIL CLASS	Clean gravel	Clean sands, mixture of clean sands & gravels	Very fine sands, silts, mixtures of sand, silt and clay, glacial till, stratified clays etc	Unweathered clays
FLOW CHARACTERISTICS	Good aquifers		Poor aquifers	Impervious
PERMEABILITY (gal/day/ft²)	10^{2}	10^{-4} 10^{-2}	10^{-6}	10^{-7} 10^{-8}

Note that in the event that we have a layered situation in which a soil with very fine pores overlies more granular material, both being far removed from the water table, moisture content of the upper layer will be many times that of the lower which, as will be seen later, affects the electrical conductivity.

Groundwater is free to move laterally with velocities ranging from a meter or more per day to less than a meter per year, depending on the hydraulic pressure differential and the permeability of the material. Table 4 illustrates the permeability of various materials in gallons per day per square foot of cross-section per foot of hydraulic head per lateral foot of distance. It is seen from the Table that for soil materials a factor of 10^{10} separates permeable from impermeable materials. The saturated hydraulic conductivity decreases with clay content, increasing compaction, and decreasing radius of the soil pores.

The laws of hydraulic movement of water produce a water table which in general is not horizontal and in fact is often a subdued version of the local topography, all other factors being equal. Two examples are shown in Figure 6; for the humid zone the moisture moves from topographic high regions down to the draining streams whereas in an arid zone the moisture moves downwards away from the streams.

The wide ranges of permeability greatly influence the final profile of the water table or phreatic zone sometimes leading, for example, to the occurrence of a perched water table as shown in Figure 7. Again such layering will be seen subsequently to influence the electrical properties.

It will be shown in Section IV that the electrical conductivity of soils and rocks depends on the porosity and on the degree to which the pores are filled with moisture. Figure 2 showed the volumetric composition of a loam soil from which the excess water has been removed i.e. the soil is undersaturated. We see that in this temperate zone example approximately 50% of the soil is occupied by either gas or capillary water. This division into about 50% solids is fairly typical of most soils.

If all of the moisture in a soil sample is removed by drying, the ratio of the empty volume to the total volume of the soil matrix is known as the soil porosity, a parameter that is relevant to the soil conductivity. Table 5 illustrates the porosity for a variety of typical terrain materials.

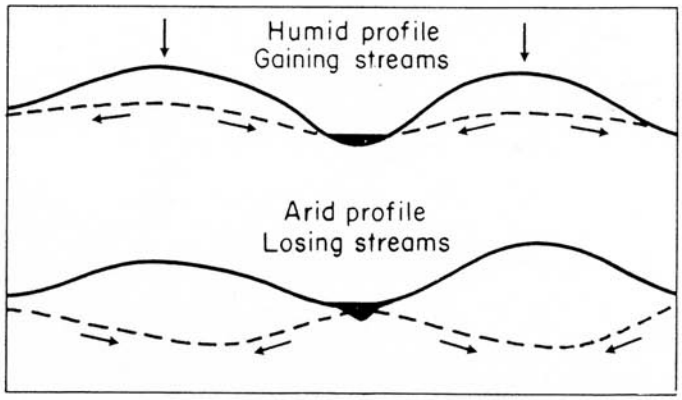
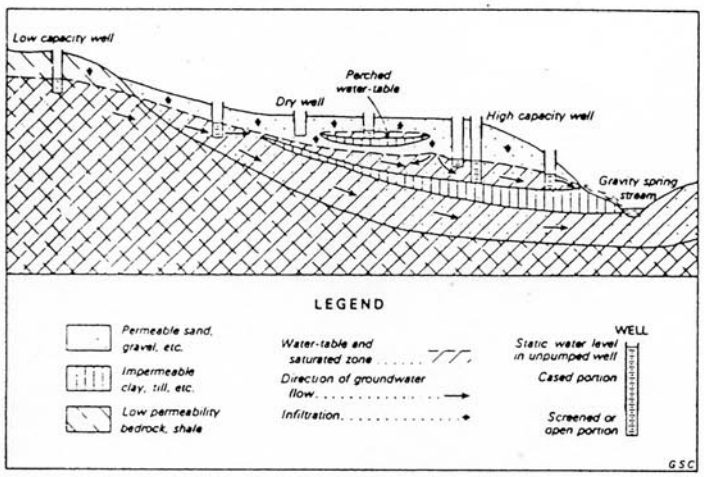


FIGURE 6. Profiles of water tables in arid and humid zones (after G. B. Maxey [9]).



Water-table conditions (unconfined aquifers).

FIGURE 7. Water-table conditions – unconfined aquifers (after I.C. Brown [13]).

TABLE 5. Representative porosity ranges for sedimentary materials (after D. K. Todd [12])

Material	Porosity, %
Soils	50–60
Clay	45–55
Silt	40–50
Medium to coarse mixed sand	35–40
Uniform sand	30–40
Fine to medium mixed sand	30–35
Gravel	30–40
Gravel and sand	20–35
Sandstone	10–20
Shale	1–10
Limestone	1–10

Table 6 gives further data on porosity and also indicates the value of the ratio ρ_x (mixture resistivity) divided by ρ_1 (electrolyte resistivity) about which more will be said later in Sections IV and V.

It is obvious that the degree of compaction of a soil will affect the magnitude of the soil porosity.

IV. ELECTRICAL CONDUCTIVITY OF SOILS AND ROCKS

In Section III it was noted that the conductivity of soils and rocks was principally electrolytic. This section will discuss the parameters that determine the conductivity of electrolytes and the effects that arise when electrolytes are present in both clay-free and clay-rich soils and rocks.

IV. 1. Properties of Electrolytes

As an introduction suppose we empty our hypothetical tank of Section II and refill it with distilled water. The measured conductivity is very low. If however a small amount of table salt (NaCl) is dissolved in the distilled water the conductivity increases substantially.

TABLE 6. Porosity of soils and rocks (after C. A. Helland [14])

Rock or Formation	Porosity	Ratio $\frac{\rho_x}{\rho_1}$
Igneous and metamorphic rocks	½– 2	100
Dense limestones and sandstones	3– 4	50 –100
Clays and sands in general	8–15	20 – 40
Porous clays, sands, sandstone, cellular limestones, and dolomites	15–40	3 – 20
Marl, loess, clay, and sandy soil	40–75	1.5– 4
Peat, diatomaceous earth	80–90	1.0– 1.5

TABLE 7. Mobility of common ions at 25°C (after Keller and Frischknecht [5])

ion	Mobility (m^2/sec V)
H^+	36.2×10^{-8}
OH^-	20.5×10^{-8}
SO_4^-	8.3×10^{-8}
Na^+	5.2×10^{-8}
Cl^-	7.9×10^{-8}
K^+	7.6×10^{-8}
NO_3^-	7.4×10^{-8}
Li^+	4.0×10^{-8}
HCO_3^-	4.6×10^{-8}

The conductivity of an electrolyte is proportional both to the total number of charge carriers (ions) in the solution and their velocity. In distilled water there are few ions and the conductivity is low. The dissolved sodium chloride molecules dissociate to form both positively charged sodium ions and negatively charged chloride ions which greatly increase the conductivity.

When a voltage is applied between the two end plates an electric field is established in the tank; the positively charged ions are attracted towards the negative plate, the negatively charged ions to the positive plate. The velocity of the ions is effectively controlled by the viscosity of the fluid. This velocity is slightly different for different ions since it depends upon their effective diameter, as illustrated in Table 7, where it can be seen that chloride ions move slightly more rapidly than the sodium ions.

In a sodium chloride solution the amount of current that flows, and therefore the electrical conductivity, is proportional to the sum of the number of sodium ions multiplied by their mobility (velocity per unit electric field) and the number of chloride ions multiplied by their mobility.

The further addition of different salts to our tank would increase the electrical conductivity independently of the presence of the sodium and chlorine ions as long as the concentrations remain reasonably dilute. The following equation is often used to calculate the approximate electrical conductivity in mhos per meter of a dilute solution of various salts at normal ambient temperatures:

$$\sigma = 96500[C_1M_1 + C_2M_2 + \ldots] = 96500 \sum C_iM_i \quad (4)$$

where C_i = no. of gram equivalent weights of ith ion per 10^6 cm^3 of water

M_i = mobility of ith ion in meters per second per volt per meter.

For example, suppose that one gram of salt is dissolved in our tank which holds 10^6 cm^3 of water. The atomic weight of sodium is 23, of chlorine is 35, so the atomic weight of sodium chloride is 23 + 35 = 58. Since we have introduced one gram of sodium chloride we have introduced

$$\frac{23}{58} \text{ grams of sodium and } \frac{35}{58} \text{ grams of chlorine.}$$

The gram equivalent weight of an ion is the atomic or molecular weight of the ion divided by its valence. In the case of both sodium and chlorine the valence is one so the gram equivalent weight of sodium is 23 grams, of chlorine 35 grams.

Then the number of gram equivalent weights of sodium per 10^6 cm^3 of water is given by

$$C_{Na} = \frac{\text{weight of Na per } 10^6 \text{ cm}^3 \text{ } H_2O}{\text{gram equivalent weight}} = \frac{23/58}{23} = \frac{1}{58}$$

and that for chlorine is given by

$$C_{Cl} = \frac{\text{weight of Cl per } 10^6 \text{ cm}^3 \text{ } H_2O}{\text{gram equivalent weight}} = \frac{35/58}{35} = \frac{1}{58}$$

Using the data from Table 7 for the mobilities at 25° C we find that the conductivity for one gram of sodium chloride in 10^6 cm^3 of water is given by

$$\sigma = 96500\left[\frac{1}{58} \times 5.2 \times 10^8 + \frac{1}{58} \times 7.9 \times 10^8\right]$$
$$= 0.00022 \text{ mho/m.} \quad (5)$$

The addition of only one part per million of sodium chloride by weight has produced the appreciable conductivity of 0.22 millimhos per meter.

The concentration of dissolved salts in natural groundwaters is substantially higher than one part per million, as a result of which their conductivity is much greater than 0.22 millimhos per meter. For example Table 8 illustrates the contribution of various ions to the measured conductivity of three of the Great Lakes. Lakes Erie and Huron which both occur in regions of Paleozoic carbonate rocks contain more dissolved salts than Lake Superior which is situated largely in Precambrian crystalline rocks, and this is reflected in the higher conductivities of the first two lakes. The bottom line of the table gives the measured conductivity: agreement with the calculated values using the above equations is good.

The following data from Heiland [14] illustrates typical values for the conductivity of various natural waters.

1. Meteoric waters, derived from precipitation; 1 to 30 millimhos per meter.
2. Surface waters (lakes, rivers) vary from 0.3 millimhos per meter for very pure water to as large as 10,000 millimhos per meter for salt lakes. Surface waters in districts of igneous rocks are estimated to range from 2 to 30 millimhos per meter; surface waters in areas of sedimentary rocks vary from 10 to 100 millimhos per meter (compare the Great Lakes above).
3. Soil waters (discharged into the atmosphere by evaporation) may be as large as 10,000 millimhos per meter but their average is around 10 millimhos per meter.
4. Normal groundwater in areas of igneous rock ranges from 6 to 30 millimhos per meter and in areas of sedimentary rocks to as large as 1,000 millimhos per meter.
5. Mine waters (copper, zinc, etc., sulfates) are of high conductivity, generally not less than 3,000 millimhos per meter.

TABLE 8. Conductivity of Great Lakes with contribution of the various ions (after L. H. Doherty [15])

Ion	Lake Erie	Lake Huron	Lake Superior
HCO_3	5.8	4.1	2.6
Ca	10.1	7.3	3.8
Mg	3.6	3.2	2.4
Na	1.8	0.6	0.2
Cl	3.9	1.2	0.2
SO_4	3.4	1.8	0.3
Calculated Conductivity (mmhos/m)	28.6	18.2	9.5
Measured Conductivity (mmhos/m)	26.7	18.2	8.4

The temperature dependence of the electrical conductivity of the electrolyte is almost entirely due to the temperature dependence of the viscosity of the liquid, which in turn directly affects the ionic mobility. The variation of either quantity with temperature is approximately linear over normal ambient temperatures. The temperature coefficient for a sodium chloride solution is 0.022 which value applies approximately to most other ions so that the electrolyte conductivity for a temperature other than 25°C is given by

$$\sigma(T) = \sigma(25°C)[1 + \beta(T - 25°)]$$

where $\beta = 2.2 \times 10^{-2}$ per °C

T = temperature (°C) at which conductivity is to be calculated.

A change of conductivity of 2.2% per degree centigrade implies that a change in temperature of 40°C will cause the conductivity to nearly double. The effect of temperature is illustrated in Figure 8 which shows calculated conductivity of four of the Great Lakes as a function of season.

The change of conductivity with temperature and therefore with season is not negligible and this applies equally well to ground conductivity over the normal range of ambient temperatures.

IV. 2. Conductivity of Saturated Clean (Clay-Free) Mixtures

We have examined how the electrical conductivity of the electrolyte in our tank varies with the concentration of dissolved salts and with temperature. Let us now start to fill the tank with perfectly insulating spheres of uniform radius (for example uniform pebbles). Assume for the time being that we can maintain these spheres uniformly dispersed throughout the solution. Since the spheres are insulating, the electrical current will find it more difficult to cross the tank and the conductivity will be reduced. A relationship was derived by Maxwell for the conductivity σ_x of a mixture consisting of a medium with conductivity σ_1 in which spherical grains of conduc-

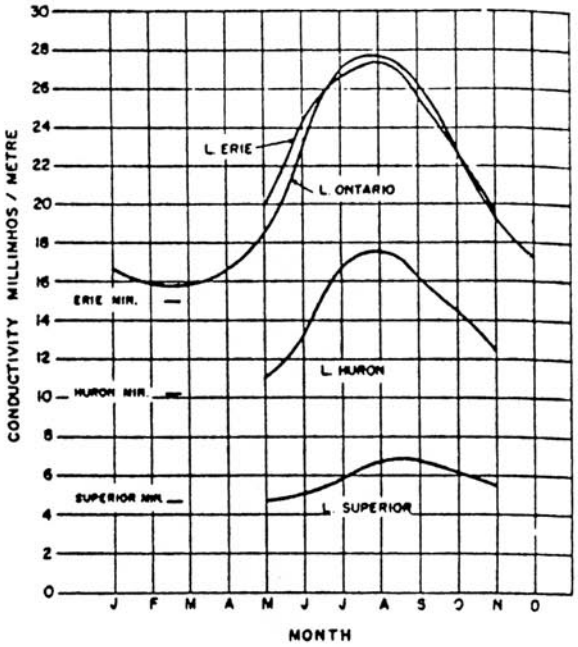


FIGURE 8. Seasonal variation of conductivity of Lakes Ontario, Erie, Huron and Superior (after L.H. Doherty [15]).

tivity σ_2 (here assumed to be zero) are imbedded in regular arrangement and in such a manner that their spacing is large compared with their radius [14]. Letting n be the porosity of the mixture (defined as the ratio of the volume of solution only, divided by the total volume of the solution including the spheres) Maxwell showed that the conductivity of the mixure was given by

$$\frac{\sigma_x}{\sigma_1} = \frac{2n}{3 - n} \tag{7}$$

In Section II it was shown that the conductance of a current path is directly proportional to the cross-sectional area and inversely proportional to the length. The addition of insulating spheres to the tank tends to reduce the cross-sectional area available for current flow and to increase the effective length of the current paths, reducing the overall conductivity.

This dilute mixture does not resemble a soil so we continue to add insulating spheres until the tank is full. The condition for Maxwell's derivation, that the inter-particle distance be large compared with the particle radius, is invalid and the above equation can no longer be expected to apply. It turns out however that an almost equally simple empirical relationship called Archie's Law [5] is applicable to clean (i.e. clay-free) saturated mixtures. This equation is

$$\frac{\sigma_x}{\sigma_1} = n^m \tag{8}$$

where n is the fractional porosity defined above and m is a constant. The reciprocal quantity ρ_x/ρ_1 is often called the formation factor (FF) of the rock or soil sample.

Originally derived from resistivity measurements on samples of consolidated porous rock, this equation also applies to a variety of unconsolidated materials. That such a simple law should give excellent results for a variety of both consolidated and unconsolidated materials with widely differing porosities is a surprise and indeed the underlying reasons for its success are not well understood [4]. It has been established [16] that in the case of marine sands the exponent m is dependent on the *shape* of the particles, increasing as they become less spherical (i.e. more platey) and that variations in the *size* of the particles and in the *dispersion* of sizes appear to have a very small effect.

Values of m are listed in Table 9 where it is seen that m varies from 1.2 for insulating spheres to 1.85 for very platey fragments of shell. Samples of natural sands have values in the range 1.4 to 1.6. The value of 1.85 for shell fragments is in good agreement with earlier measurements made on kaolinite particles and marine illite clays. This fact may or may not be significant for clays in normal soils depending on the extent to which ion exchange effects also contribute to the conductivity as discussed further on in this section.

Archie's Law for various exponents is plotted in Figure 9 along with Maxwell's Law. Over the range of porosities of most unconsolidated terrain materials (20% to 70% – see Tables 5 and 6) the different exponents do not greatly affect the mixture conductivity. Interestingly enough, Maxwell's Law gives excellent agreement with Archie's Law with exponent m = 1.3 over all ranges of porosity.

It would appear that for relatively clay-free substances located beneath the water table (so that the mixture is completely saturated) the primary matrix property measured through the electrical conductivity is the porosity of the matrix, essentially independent of the particle size or the particle size distribution. This explains why it is a relatively difficult matter using resistivity techniques to distinguish between sand and gravel. As long as the porosity is the same for both sand and gravel the resistivity or conductivity contrast may be quite small.

Another point is that if the porosity is assumed to vary from 20% to 70% the conductivity of the mixture varies by a factor of approximately 8, depending somewhat on which value of exponent is adopted. Even in clean mixtures we do not expect a large range of conductivities and experimentally this has been confirmed.

TABLE 9. The effect of particle shape on the FF/n relation using artificial samples of decreasing sphericity. (after P. D. Jackson et al. [16])

Sample no.	Mean size ϕ^*	Spread of sizes	Sphericity	Best fit Archie line FF = n^{-m} m ± 0.01
Spheres	0.38	0.17	1.0	1.20
Rounded sand	0.38	0.17	0.83	1.40
Shaley sand	0.50	0.34	0.78	1.52
Shell fragments	0.38	0.17	0.5	1.85

*$\phi = -\log_2$ (diameter in mm).

Figure 9 is useful for the following type of calculation: in many glacial deposits gravel appears as pebbles (of the order of a few centimeters in diameter) dispersed throughout a mixture of finer relatively clean sand. How does the presence of this gravel modify the mixture conductivity? To obtain an approximate answer let us assume that the sand itself has a porosity of 30%. Using Archie's Law with m = 1.6 the electrical conductivity of the sand/water mixture will be 15% of the conductivity of the water. Assuming a water conductivity of 20 millimhos per meter gives a conductivity for the mixture of 3 millimhos per meter, a not uncommon value. We use this value in conjunction with Figure 9 to determine the effect of introducing pebbles into the mixture. If for example the pebbles occupy 50% of the volume the conductivity of the mixture will fall to one-third or approximately 1 millimho per meter, also a value that commonly occurs in actual practice. As will be seen later the addition of a relatively small amount of clay can increase these numbers by virtue of increasing the conductivity of the pore water but the relative values may well be similar.

IV. 3. Conductivity of Unsaturated Clean Mixtures

For Archie's Law to apply the material must be fully saturated with fluid. If the mixture is partially saturated the conductivites will be decreased since gas or air bubbles act as insulating particles to further impede the current flow. In the funicular stage of soil moisture the pendular rings have coalesced so that the liquid films are continuous throughout the pore space but only a fraction of the available pore space is filled with water. This moisture varies with time and temperature as a result of drainage, evaporation, and loss of water to plant roots.

In the event that the soil is partially desaturated the following approximate expression applies [5]

$$\frac{\sigma_x}{\sigma_1} = s^n \tag{9}$$

where s is the fraction of total pore volume filled with electrolyte and n is a parameter experimentally determined to be approximately 2. This expression is equivalent to Archie's Law with m = 2 and indicates as seen from Figure 9 that if a small fraction of the total pore volume is filled with water the conductivity can be very low.

More recent work on soils has shown that the electrical conductivity varies as follows with moisture content when the soil is partially desaturated [17]

$$\sigma_x = \sigma_1 \theta(a\theta + b) + \sigma_s \tag{10}$$

where θ is the volumetric water content (cm^3 of water per cm^3 of soil), a and b are constants which depend on the soil texture, and σ_s is a contribution from "surface conductivity" which will be discussed under Colloidal Conductivity. The values of the empirically determined constants a and b for a variety of soils are shown in

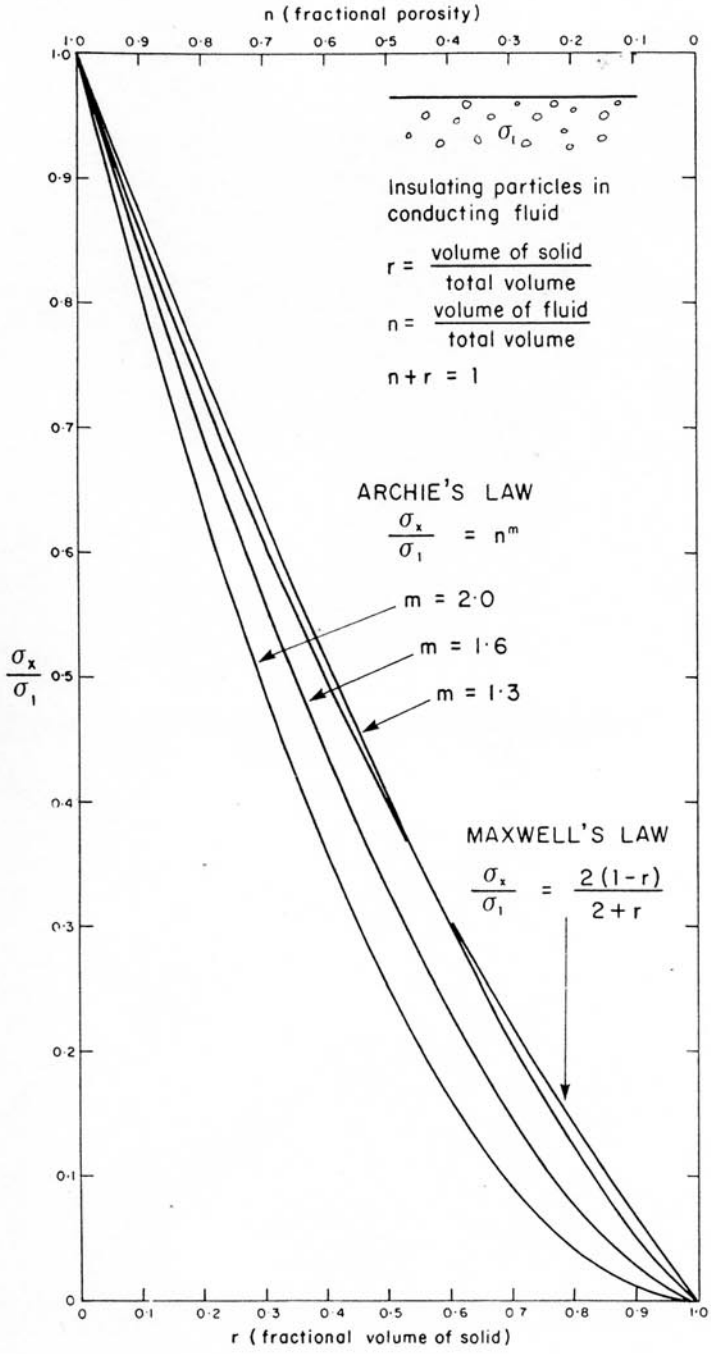


FIGURE 9. Graph of Archie's Law and Maxwell's Law.

Table 10 from which it is seen that except for very low moisture the relationship is essentially a square law with mosture content.

It has been suggested by Rhoades et al [17] that it might be possible to estimate the values of σ_s, a, and b on the basis of soil texture and mineralogy and, given a measurement of the bulk soil conductivity and the moisture content, to determine the conductivity of the fluid and thus salinity.

IV. 4. Electrical Layering Arising from Soil Moisture

From the preceding paragraphs we observe that, even if the soil material is physically homogeneous, for example consists of clean well-sorted silt, as soon as we introduce soil moisture of finite electrical conductivity we have established a medium in which the electrical conducvitity can vary strongly with depth. Near surface where the moisture content is low the conductivity is also low. With

TABLE 10. Measured moisture content constants and surface conductivities (after J. D. Rhoades et al. [17])

Soil type	a	b	σ_s
			mmho/cm
Pachappa fsl	1.382	−0.093	0.18
Indio vfsl	1.287	−0.116	0.25
Waukena l	1.403	−0.064	0.40
Domino cl	2.134	−0.245	0.40

increasing depth the conductivity rises rapidly as the moisture films become continuous, then more slowly as the available pore volume starts to fill, eventually saturating with complete filling of the pores. This situation will be rendered even more complex if the porosity itself is, as is often the case, a function of depth as suggested by the profile of Figure 4.

IV. 5. Colloidal Conductivity

It will be recalled that for clays the cation exchange capacity (CEC) was a measure of the number of ions adsorbed to the surface of clay particles. When the clay particles are immersed in a liquid there is evidence to show that these adsorbed ions can partially dissociate themselves from the clay particles and become available for ionic conductivity. Since the ion exchange capacity of clays can be great due to their large surface area many ions may be supplied for electrical conductivity; the addition of a small amount of clay to an otherwise clean mixture can substantially increase the electrical conductivity.

The addition of clay appears to affect the electrical conductivity of the mixture in two ways. Repeating equation (10)

$$\sigma_x = \sigma_1\theta(a\theta + b) + \sigma_s \qquad (10)$$

the added ions increase the value of σ_1 above the value that the porewater would have in the absence of the clay. Furthermore although dry clay is highly resistive, as soon as a thin layer of moisture (perhaps only a few molecules thick) surrounds the clay particles ion movement across the surface of the clay particle within the cloud of adsorbed ions may occur. This surface contribution to the conductivity, essentially independent of the moisture content, is the second term in the equation. It will be most significant at low moisture contents.

The contribution to σ_1 from clay content will be most evident for soils in which the porewater is relatively pure (and therefore has low conductivity) and will be least effective in soils having highly saline porewater. For either contribution we should expect that clays with higher CEC will produce more conductive soils and a comparison of Table 11 with Table 2 shows that this is the case

In summary, in areas where the soil porewater is not particularly saline the electrical properties of the soil may be strongly influenced by and indeed in some cases completely dominated by the amount and type of clay minerals present. The possible influence of clay materials should always be kept in mind. It is also possible that a similar effect arises as a result of the colloidal properties of humus which might be important in tropical climates where the humus layer is well leached and contains few clay minerals.

IV. 6. Effects of Freezing on Soil Conductivity

Suppose that we take our tank, filled with a clean sand/water mixture, and start to lower the temperature. The electrical conductivity of the mixture will decrease in exactly the same way that the conductivity of the electrolyte does. When the temperature reaches 0°C the water freezes and since the conductivity of ice is extremely low the conductivity of the mixture falls essentially to zero.

Now suppose that in addition to the sand some clay is introduced to the mixture and the temperature is again reduced. As the temperature passes through 0°C some of the water freezes; however the

TABLE 11. Physical properties of typical Upland and Lowland soils in western Puerto Rico (after J. W. Walker et al. [18])

Topographic location	Sample no.	Moisture (%)	Conductivity (mmho/m)	Clastic material (%)	Clay fraction (%)	Clay type(s) (%)
Uplands	1	42	16.0	21	79	100% kaolinite
Uplands	2	46	1.2	42	58	100% kaolinite
Uplands	3	25	1.0	5	95	100% kaolinite
Lowlands	4	21	65.0	66	34	100% montmorillonite
Lowlands	5	32	169.0	39	61	60% montmorillonite 40% kaolinite
Lowlands	6	25	269.0	15	85	90% montmorillonite 10% kaolinite

electrical field of the adsorbed ions on the clay particles locally orients the neaby water molecules to prevent their freezing [17]. Furthermore as the solvent freezes there is a tendency for the impurity ions to stay within the liquid fraction and the actual electrical conductivity of the remaining liquid water increases with decreasing temperature. The net result is that mixtures containing clay or silts tend to have an electrical conductivity which decreases relatively slowly with temperature as the temperature passes through 0°C and indeed to retain a moderate conductivity even at temperatures well below freezing as illustrated in Figure 10.

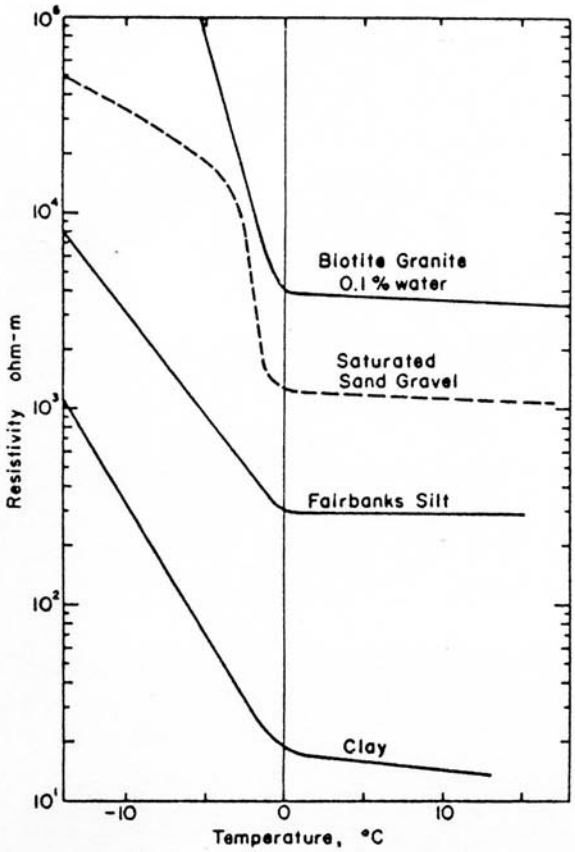


FIGURE 10. Resistivities for several soils and one rock type as a function of temperature (after Hoekstra and McNeill [20]).

IV. 7. Electrical Properties of Rocks

As with unconsolidated materials the matrix of most water-bearing rocks is insulating and the electrical conductivity is also electrolytic. A major difference between unconsolidated sediments and rocks lies in the types of pore geometries. For example in sedimentary rocks the porosity is generally inter-granular and consists of voids still remaining from the compaction process. In igneous rocks the porosity of the rock itself may be extremely small, however moisture circulates through fractures in the rock which are the result of mechanical breakage. These cracks are called joints and may be sufficiently large and/or numerous that their presence completely dominates the electrical conductivity. Such jointing may also play a major role in the conductivity of the more impermeable sedimentary rocks. When large joints are present the local conductivity may be expected to vary strongly with position. A third form of porosity which may not make a major contribution to electrical conductivity as normally measured is vugular porosity. It consists of cavities (as might be caused by solutions circulating in limestone) interconnected by small pores which dominate the D.C. electrical behavior. It should be noted that in the case of electromagnetic excitation of currents direct electrical (ohmic) inter-cavity connection is not necessary and appreciable response to this excitation may come from the fluid in each cavity separately.

Table 12 illustrates normal porosity for various rock types. It is seen that the total porosity can be very small, of the order of a few percent, and we would therefore expect, particularly for unfractured Precambrian igneous rocks and high-ranking metamorphosed rocks, the electrical conductivity to be very low, as is generally the case. On the other hand shales may be relatively porous and in addition the conductivity of the pore water may be high as a result of ion exchange effects. For this reason shales can be as conductive as 30 to 40 millimhos per meter and in some cases even higher.

Since in general the porosities are smaller for consolidated materials and furthermore at this end of the scale the various exponents in Archie's Law have a large effect, it is difficult to predict the electrical properties of any given rock type.

There is another feature which occurs in sedimentary rocks and which is of importance in determining their electrical characteristics. Being depositional in nature these rocks are layered and the electrical conductivity perpendicular to the bedding planes may be less than the conductivity parallel to the planes.

This feature is illustrated in Table 13 which lists the coefficient of anisotropy for various layered rocks. The coefficient is defined in Figure 11.

Another type of rock conductor called a structural conductor [21] occurs as a result of fracturing and is often linear in shape. Such conductors arise in the interior of faults, shear zones, contact frac-

TABLE 12. Normal ranges in porosity for rocks (after Keller and Frischknecht [5])

Rock type	Intergranular porosity (%)	Joint porosity (%)	Vugular porosity* (%)
Paleozoic sandstones and shale	5–30	0–1	0
Paleozoic limestones	2–10	0–2	0
Paleozoic clastic volcanics	5–30	0–2	0
Post Paleozoic sandstones and shale	10–40	0	0
Post-Paleozoic limestones	4–20	0–2	0
Post-Paleozoic clastic volcanics	10–60	0	0
Precambrian sediments and low-rank metamorphosed sediments	1–8	0–2	0
Precambrian igneous rocks and high-rank metamorphic rocks	0–2	0–2	0
More recent igneous rocks	0–10	0–2	0

*Vugular porosity accounts for an appreciable total porosity only in rare cases.

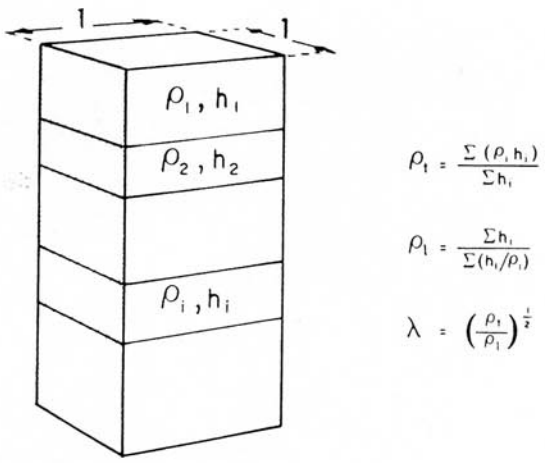


FIGURE 11. Definition of coefficient of anisotropy (λ) for layered sediments (after Keller and Frischknecht [5]).

TABLE 13. Coefficients of anisotropy for layered rock (after Keller and Frischknecht [5])

Rock type	Coefficient of anisotropy
Volcanic tuff, Eocene and younger, from Nevada	1.10–1.20
Alluvium, thick sections from the southwestern United States	1.02–1.10
Interbedded limestones and limey shales from northeastern Colorado	2.0 –3.0
Interbedded anhydrite and shale, northeastern Colorado	4.0 –7.5
Massive shale beds	1.01–1.05
Interbedded shale and sandstone	1.05–1.15
Baked shale or low-rank slate	1.10–1.60
Slates	1.40–2.25
Bituminous coal and mudstone	1.7 –2.6
Anthracite coal and associated rocks	2.0 –2.6
Graphitic slate	2.0 –2.8

ture zones, etc., where the rock material has been ground into small particles which allows increased circulation of groundwater resulting in enhanced weathering to produce clay minerals. Structural conductors occur in a wide range of sizes.

V. EXAMPLES OF CONVENTIONAL MEASUREMENTS OF SOIL AND ROCK RESISTIVITIES

The material in this section gives a broad indication as to the range of resistivity or conductivity which might be encountered in various terrain materials in various climatic zones. Extreme caution must be exercised in employing these values for anything other than a rough guide as to anticipated survey results.

As an introduction Table 14 illustrates the resistivities of igneous and metamorphic rocks as given by Telford et al [22]. Table 15 lists resistivities of sediments from the same source. Table 6, from Heiland [14], lists the ratio ρ_x/ρ_0 as defined in Section IV for various consolidated and unconsolidated materials.

V. 1. Temperate Zones

Table 16 records the ranges of resistivity compiled for different terrain materials from a variety of survey and laboratory measurements, from Culley et al [23].

Table 17 from Sellman et al [24] shows survey data over different soil types made with three different measurement techniques (i) radio-frequency magneto-telluric at approximately 300 kHz, (ii) low-frequency magnetically induced currents using dipole transmitter and receiver at 10 kHz, and (iii) standard Wenner array at DC. The measured resistivities are relatively independent of the method of measurement; the general trend of increasing resistivity with particle size should be noted.

A complete set of measurements by Smith-Rose [25] on a variety of soils from different depths, with different moisture contents, and measured at various frequencies, shows that at the lower frequencies (i.e. between 1 and 100 kHz) the conductivity of soils is essentially independent of frequency. At higher frequencies the conductivity rises and the increase in conductivity is generally greatest for the most poorly conducting samples. The results of his laboratory measurements on soil samples taken from various parts of England are illustrated in Table 18 and profiles of conductivity with depth

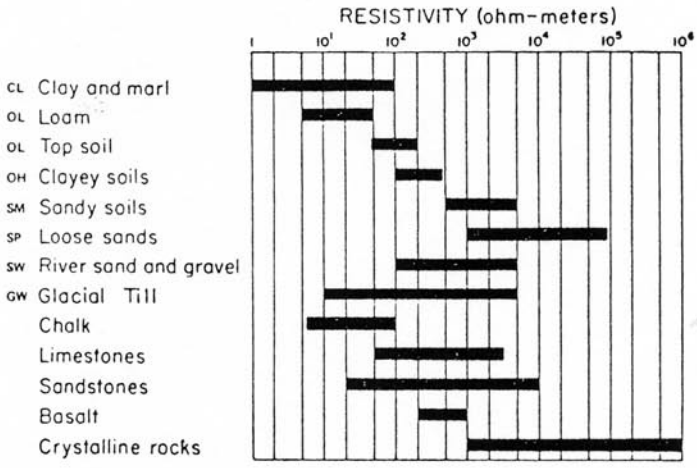
TABLE 14. Resistivities of igneous and metamorphic rocks (after W. M. Telford et al. [22])

Rock type	Resistivity range (Ωm)
Granite	3×10^2–10^6
Granite porphyry	4.5×10^3 (wet)–1.3×10^6 (dry)
Feldspar porphyry	4×10^3 (wet)
Albite	3×10^2 (wet)–3.3×10^3 (dry)
Syenite	10^2–10^6
Diorite	10^4–10^5
Diorite porphyry	1.9×10^3 (wet)–2.8×10^4 (dry)
Porphyrite	10–5×10^4 (wet)–3.3×10^3 (dry)
Carbonatized porphyry	2.5×10^3 (wet)–6×10^4 (dry)
Quartz porphyry	3×10^2–9×10^5
Quartz diorite	2×10^4–2×10^6 (wet)–1.8×10^6 (dry)
Porphyry (various)	60–10^4
Dacite	2×10^4 (wet)
Andesite	4.5×10^4 (wet)–1.7×10^2 (dry)
Diabase porphyry	10^3 (wet)–1.7×10^5 (dry)
Diabase (various)	20–5×10^7
Lavas	10^2–5×10^4
Gabbro	10^3–10^6
Basalt	10–1.3×10^7 (dry)
Olivine norite	10^3–6×10^4 (wet)
Peridotite	3×10^3 (wet)–6.5×10^3 (dry)
Hornfels	8×10^3 (wet)–6×10^7 (dry)
Schists (calcareous and mica)	20–10^4
Tuffs	2×10^3 (wet)–10^5 (dry)
Graphite schist	10–10^2
Slates (various)	6×10^2–4×10^7
Gneiss (various)	6.8×10^4 (wet)–3×10^6 (dry)
Marble	10^2–2.5×10^8 (dry)
Skarn	2.5×10^2 (wet)–2.5×10^8 (dry)
Quartzites (various)	10–2×10^8

TABLE 15. Resistivities of sediments (after W. M. Telford et al. [22])

Rock type	Resistivity range (Ωm)
Consolidated shales	$20–2 \times 10^3$
Argillites	$10–8 \times 10^2$
Conglomerates	$2 \times 10^3–10^4$
Sandstones	$1–6.4 \times 10^8$
Limestones	$50–10^7$
Dolomite	$3.5 \times 10^2–5 \times 10^3$
Unconsolidated wet clay	20
Marls	3–70
Clays	1–100
Alluvium and sands	10–800
Oil sands	4–800

TABLE 16. Resistivity ranges for various terrain materials (after Culley et al. [23])

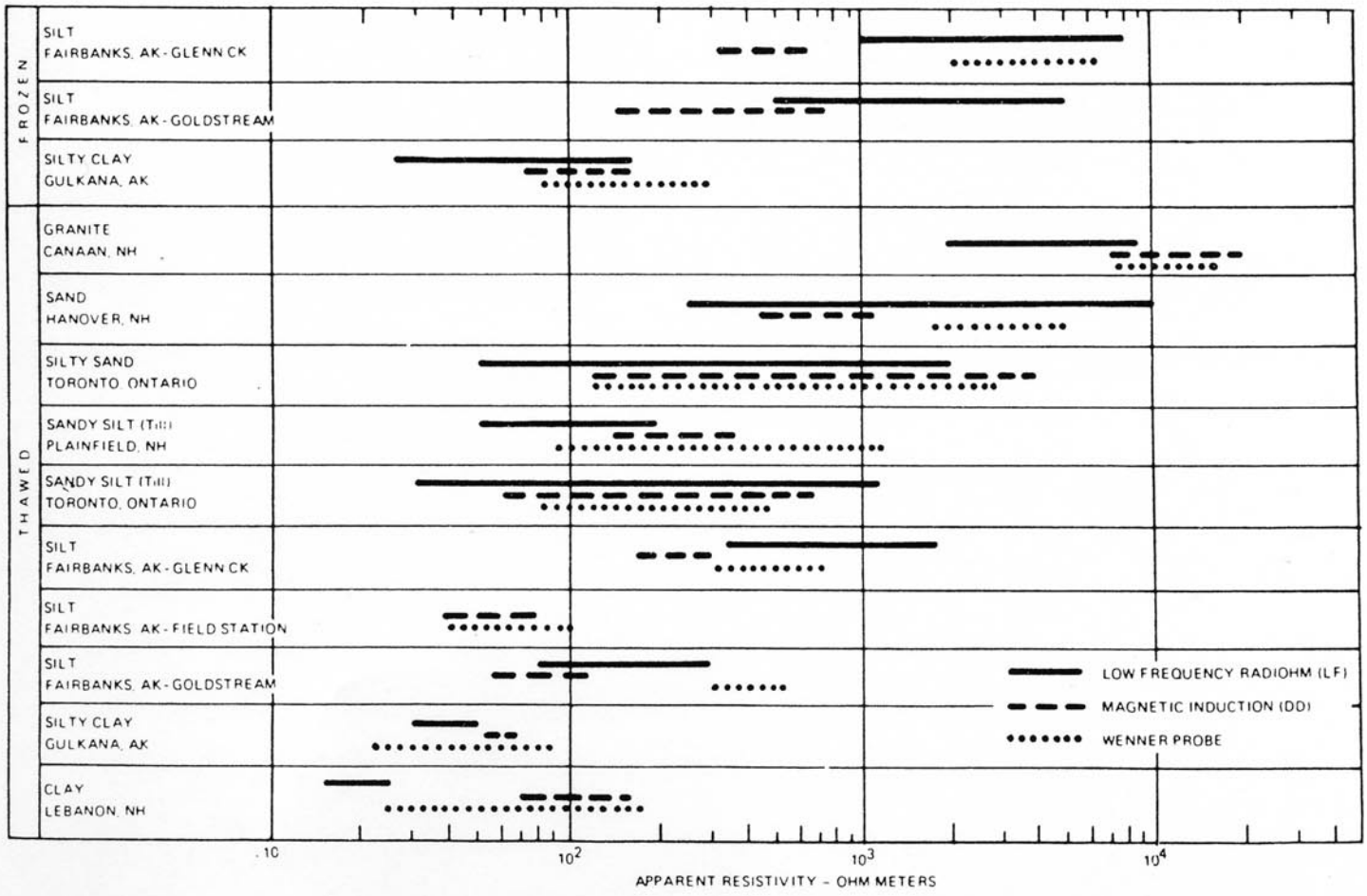


from these measurements are shown in Figure 12. It is seen from Table 18 that the soil type varies rapidly with depth, as does the soil moisture content; both of these influence the conductivity profiles. Smith-Rose concludes that clays have the highest conductivities, greater than 10 millimhos per meter, loams and chalks are of the order or 10 millimhos per meter and sandy or gritty soils are appreciably less. He also points out that a diurnal temperature range of 20°C at the surface of the soil represents a temperature change of approximately 1.4°C at a depth of one foot. Measurements made on a soil sample at 1.2 MHz as a function of moisture content by weight show a conductivity that increases approximately as the square of the moisture content.

V. 2. Tropical Humid Zones [26]

The examples given above have been taken from temperate zone soils and seem to be fairly representative. In the case of soils occurring in tropical humid climates (annual temperatures of the order of 25°C; annual precipitation of greater than a meter, generally falling during a part of the year) the weathering can be very deep. Indeed, unweathered parent rock may not occur until 30 meters in flat country, 60 meters in hilly country and in rare occasions depths

TABLE 17. Apparent resistivity data obtained for various material types using three measuring techniques (after Sellman et al. [24])



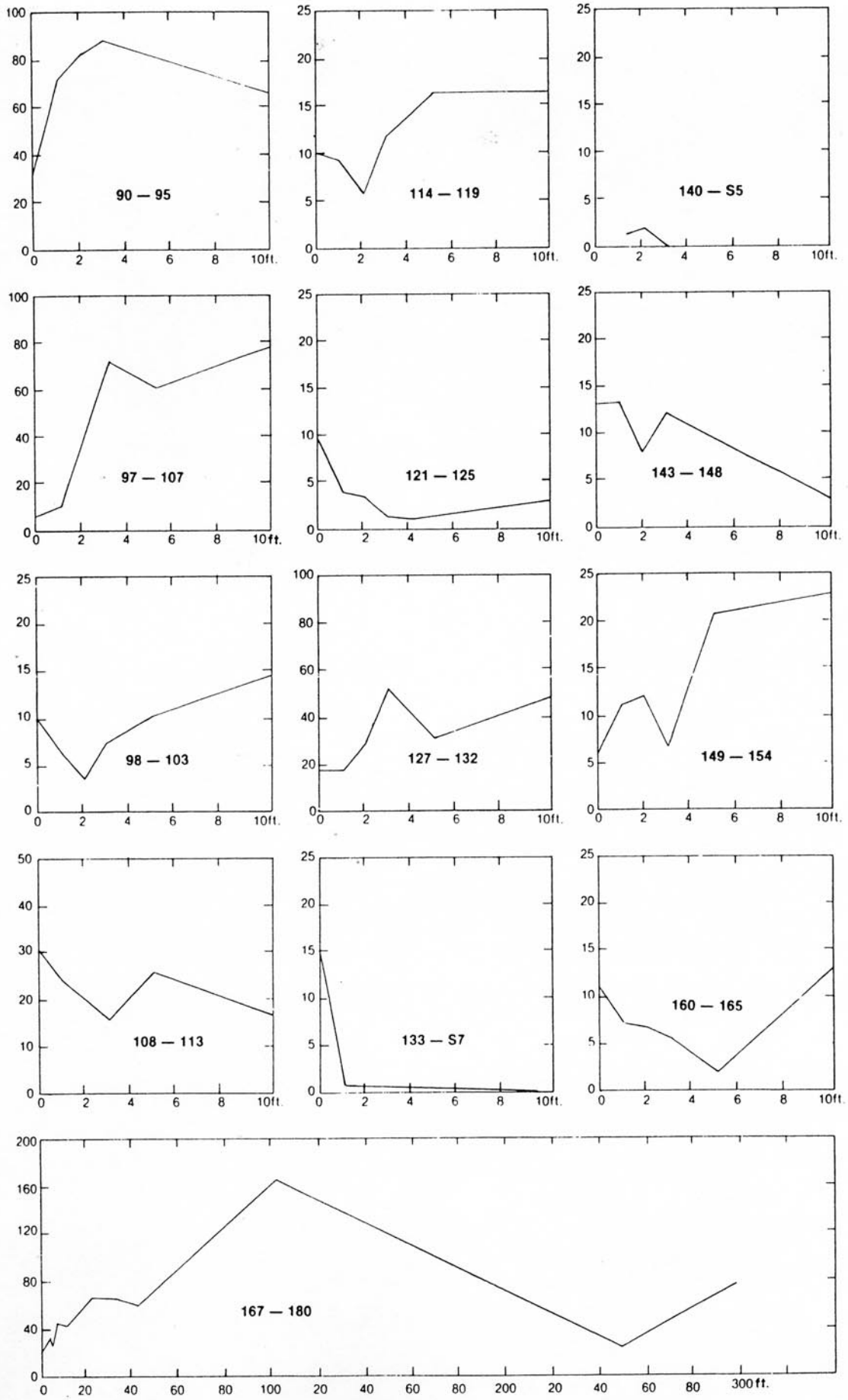


FIGURE 12. Plots of conductivity (mmhos/m) versus depth (feet) for data in Table 18.

TABLE 18. Measurements of samples of soil taken from different depths at various sites (after R. L. Smith-Rose [25])

Sample No.	Site	Geological classification	Depth	Description of sample	Moisture content	Conductivity at 20°C Millimho/m	
						1 kHz	100 kHz
			ft.		per cent		
90	Rugby Radio	Lower lias	Surface	Dark fibrous loam	60	33	38
92	Station (1)		1	Loam and clay	33	72	78
93			2	Clay and sand	26	83	89
94			3	Blue clay	25	89	100
95			10	Blue clay	23	67	72
97	Rugby Radio	Lower lias	Surface	Loam	22	6.1	7.2
104	Station (2)		1	Loam and clay	13	9.4	9.4
105			3	Blue clay	27	72	83
106			5	Clay and sand	21	61	61
107			10	Blue clay	25	78	89
98	Baldock, Herts	Chalk	Surface	Fibrous loam	21	9.4	10.0
99	(P.O. Receiving Station)		1	Chalky loam	21	6.1	6.1
100			2	Chalk	24	8.1	2.9
101			3	Chalk	27	7.2	7.8
102			5	Chalk	26	10.1	15.6
103			10	Chalk	27	14.4	15.6
108	Tatsfield, Kent	Upper	Surface	Fibrous loam	37	30	38
109	(B.B.C. Receiving Station)	greensand	1	Brown, sandy clay	1	24	27
110			2	Brown sand	15	20	22
111			3	Light brown sand	13	15.6	10.7
112			5	Light brown sand	20	26	26
113			10	Yellow sand	15	16.7	19
114	Brookmans Park, Herts	London	Surface	Fibrous loam	19	10.0	10.6
115	(London Regional Station)	clay	1	Stony loam	18	9.4	10.0
116			2	Light sandy clay	22	5.6	7.2
117			3	Sandy clay	22	12.2	13.3
118			5	Sandy clay	21	16.7	18.8
119			8 to 10	Clay and shingle	10	16.7	17.8
121	Daventry	Upper lias	Surface	Fibrous loam	28	9.4	10.6
122	Northants		1	Sandy loam	16	3.8	3.8
123			2	Brown sand	14	3.2	3.2
124			3	Brown sand	5.0	1.1	1.2
126			5	Sand and sandstone	8.5	0.8	1.0
125			10	Sand and sandstone	24	2.9	3.7
127	Washford Cross, Somerset	Red Marls	Surface	Reddish-brown loam	23	16.7	18.9
128	(West Regional Station)		1	Reddish-brown clay	20	16.7	18.9
130			2	Reddish-brown clay	18	28.9	31
129			3	Reddish-brown clay	21	52	54
131			5	Reddish-brown clay	19	31	34
132			10	Reddish-brown clay	15	48	50
133	Brendon Hills, Somerset	Devonian	Surface	Black fibrous loam	210	14.4	16.7
134			1	Loam and slate	9.0	0.3	0.3
135			2	Loam and slate	9.0	0.2	0.2
136			3	Loam and slate	8.0	0.1	0.1
137			5	Loam and slate	5.5	0.0	0.0
S.7			10	Slate	—	0.0	0.0
140	Merrivale, Dartmoor, Devon	Granite	1	Gritty loam	18	1.3	1.3
141			2	Gritty loam	13	1.6	1.6
S.1			3 to 10	Granite	—	0.0	0.1
S.2			3 to 10	Granite	—	0.0	0.1
S.5			3 to 10	Granite	—	0.0	0.0
139	Dousland, Dartmoor, Devon	Devonian	Surface	Loam	47	6.1	6.7
142			1	Dark brown loam	41	2.7	2.7
S.4			Below 1	Slate	—	0.0	0.0
S.6			Below 1	Granite	—	0.0	0.0
143	Moorside, Edge, Yorks	Millstone grit	Surface	Fibrous loam	130	13.3	17.8
144	(North Regional Station)		1	Dark grey clay	60	13.3	15.6
145			2	Dark grey clay	35	7.8	10.6
146			3	Dark grey clay	39	12.2	16.7
147			5	Dark grey clay	19	9.4	11.1
148			10	Yellow and grey clay	15	3.4	3.7
149	Westerglen, Falkirk	Boulder	Surface	Fibrous loam	38	6.1	7.2
150	(Scottish Regional Station)	clay	1	Fibrous loam	30	11.1	11.1
151			2	Clay and loam	19	12.2	12.2
152			3	Dark grit and clay	18	6.7	7.8
153			5	Dark grit and clay	18	21	24
154			10	Dark grit and clay	15	23	26

(*continued over*)

TABLE 18. (*concluded*)

Sample No.	Site	Geological classification	Depth	Description of sample	Moisture content	Conductivity at 20°C Millimho/m	
						1 kHz	100 kHz
			ft.		per cent		
160	Teddington, Middlesex	London	Surface	Fibrous loam	26	11.1	12.2
161	(N.P.L.)	clay	1	Sandy loam	20	7.2	7.8
162			2	Sandy loam	13	6.7	7.2
163			3	Fine gravel	6.5	5.6	6.7
164			5	Coarse gravel	2.9	1.9	2.0
166			7	Fine sand	2.6	1.6	1.6
165			10	Sand and shingle	20	13.3	15.6
167	Wychbold, Droitwich	Red Marls	1	Red clay and loam	15	16.7	20
168	(Midland Regional Station)		2	Red clay	13	34	32
169			3	Red clay	14	23	24
170			5	Red clay and stones	15	43	51
171			10	Red clay and stones	21	41	44
172			20	Red clay suspension	31	67	78
173			30	Red clay suspension	41	67	78
174			40	Red clay suspension	25	61	72
175			50	Red clay	27	78	83
176			100	Grey clay and salt	28	177	233
177			150	Red clay and salt	27	—	—
178			200	Red clay and salt	24	—	—
179			250	Red clay and salt	22	24	26
180			300	Red clay and salt	31	73	89

of 250 meters have been observed. The resulting soils are red to yellow, soft with a high clay content, and with a specific gravity approximately one-half of that of the parent rock. Compared with the soils of temperate climates they are thick, humus poor, permeable, and have a high clay-silt ratio. Although the clay content is high this is somewhat compensated for by the fact that in well drained soils the clays are kaolinitic and the cation exchange capacity is less than in temperate zones (see Table 11). Iron-rich concretionary horizons called laterites form as a result of reprecipitation. These are hard, permeable, and if dry are usually very resistive.

The nature and the extent of the soil formation is a function of the rock type, texture, jointing, surface relief, vegetation, water-table, and micro-climate. For example, the relative absence of silt is due to the fact that fine-grained rocks weather faster than coarse-grained rocks; the abundance of clay results from the fact that it is a stable mineral.

An excellent series of measurements of the electrical properties of the weathered zones in tropical climates has been carried out by Palacky and Kadekaru in Brazil [27]. The measurements were done with conventional resistivity techniques and many soundings were taken. The results gave good agreement with a three-layered earth model and are summarized in Table 19. In general a resistive soil, relatively thin, is situated on top of a thick quite conductive weathered zone, in turn situated on the relatively resistive parent rock.

V. 3. Tropical Arid Zones

It is in tropical arid zones that the most conductive soils are encountered. As for humid zones the weathered layer can be many tens of meters in thickness, however in arid climates this material often contains a high salt concentration due to evaporation. Whereas the surface materials are usually dry, possibly lateritic, and resistive, deeper material may approach resistivities of the order of 1 ohm-meter. Furthermore substantial lateral variations of resistivity are not uncommon.

In the humid tropical zones referred to above the conductivity of the intermediate zone was due to the presence of an abundance of colloidal particles with moderate ion exchange capacities: abundant rainfall means that drainage patterns are well established and soil salts have long since been leached into major river channels and

TABLE 19. Tropical resistivity profiles (after Palacky and Kadekaru [27])

	Site	Soil		Weathered Zone		Bedrock	
		Thickness (meters)	Resistivity (ohm-meters)	Thickness (meters)	Resistivity (ohm-meters)	Type	Resistivity (ohm-meters)
Humid Tropical	Nova Lima	5–10	2000–15000	20–80	50–100	schists	∞
					200–400	granodiorite	∞
	Canabrava	5	90	3–18	15–27	basic	∞
		5	360	12–30	3–12	ultrabasic	∞
	Santa Fé	3	11000–18000	35	80–100	dunite	∞
	Quatipuro	0–1	200	15–35	10–30	phyllites	∞
			300–700	3–8	35–20	serpentinites	> 300
Arid Tropical	Santa Luz	–		3.5	65	granite	910
		1	120	10–20	13	basic volcanic	∞
	Curaça	–		6–10	20–35	amphibolites	1200
				15–20	80–130	gneiss	2000

TABLE 20. Diagnostic criteria for distinguishing between unaffected soil sites and encroaching and developed saline seeps (after Rhoades and Halvorson [28])

Site type	Salt content	Water content	Soil electrical conductivity
Unaffected	Low, increasing with depth	Low, increasing with depth	Low, increasing with depth
Encroaching saline seep	Low, increasing to a peak at a relatively shallow depth, then decreasing with further depth	Moist surface, becoming wet with depth	Intermediate, increasing to a peak at a relatively shallow depth, then decreasing with further depth
Developed saline seep	High, decreasing with depth	Relatively uniformly wet to the water table	High, decreasing with depth

thence into the oceans. In hot arid climates drainage patterns are poorly established and drainage basins may have no outlet to permanent streams. Salt-bearing waters drain from topographically high regions into lower areas where the water evaporates, leaving a high residual salt content, largely a reflection of the imperfect drainage channels.

The occasional addition of water might be due either to precipitation or irrigation. In the cultivated dry land soils of the northern Great Plains the near surface (plant root-zone) is leached with essentially pure water derived from rain and snow melt during the wet months. Rhoades and Halvorson [28] discuss how this results in a soil salinity concentration which increases with depth. However during the summer months when a saline water table in this climate is situated within approximately one meter from the surface an upwards flow of moisture is caused by evaporation at the soil surface and transpiration within the root zone. This upwards flow reverses the original leaching which transported salts downwards and causes them to ascend so that a concentration peak can form in the soil salinity profile. The soils can remain excessively wet as a result of the hygroscopic nature of the salts and because the salts reduce the effective use of water by plants via evapo-transpiration. Rhoades defines such a condition as a "saline seep" and notes that it can form without the water table actually emerging at the surface. As this seep develops the peak in the soil salinity profile moves upwards until it finally appears at or near the surface as indicated in Table 20 which illustrates the various conditions that can exist in a region which sees seasonal precipitation followed by seasonal drought. Figure 13 illustrates vertical profiles of resistivity versus depth as determined by an expanding Wenner array for the three conditions described in Table 20.

For saline soils, the contribution to conductivity from salt concentration generally outweighs that from cation exchange capacity and the conductivity is relatively independent of clay content.

The effect of weathered-zone salinity is probably at its worst in western Australia where the zone is often 100 meters in thickness and has been known to exceed 300 meters. Hygroscopic salts maintain soil moisture at levels substantially above the water table and resistivities of the order of 1 ohm-meter have been observed. Large lateral variations result from the imperfect drainage patterns; slight changes in surface topography often show up as large changes in subsurface conductivity. A lateritic hard pan is not unusual on the surface. This layer is extremely resistive and completes the complexity and difficulty of making conventional electrical measurements in this environment.

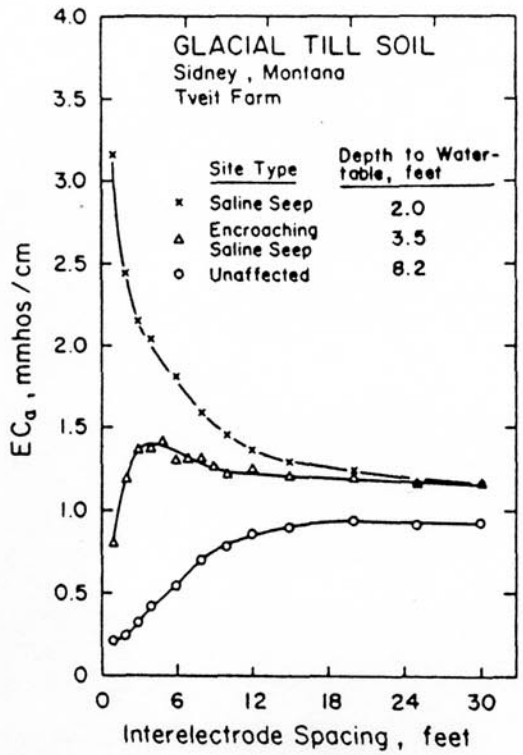


FIGURE 13. Relation between soil electrical conductivity, EC_a, and interelectrode spacing for a saline seep, an encroaching saline-seep site, and an unaffected site for glacial till-clay loam soil near Sidney, Montana (after Rhoades and Halvorson [28]).

V. 4. Arctic Zones

Finally we turn our attention to arctic regions in which permafrost is a major consideration. It should be noted that the definition of permafrost requires only that the mean annual temperature of the ground be less than 0°C for several years; the definition is completely independent of the nature of the material, the amount of moisture, and indeed whether or not the moisture is frozen. In

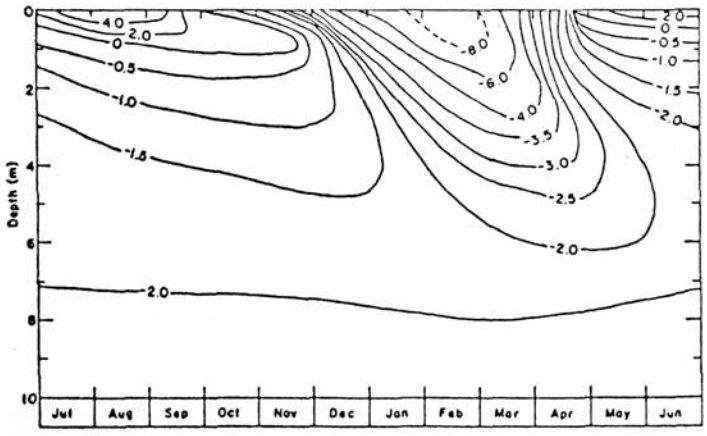


FIGURE 14. Vertical and temporal temperature variations – contoured in °C (after Arcone et al [29]).

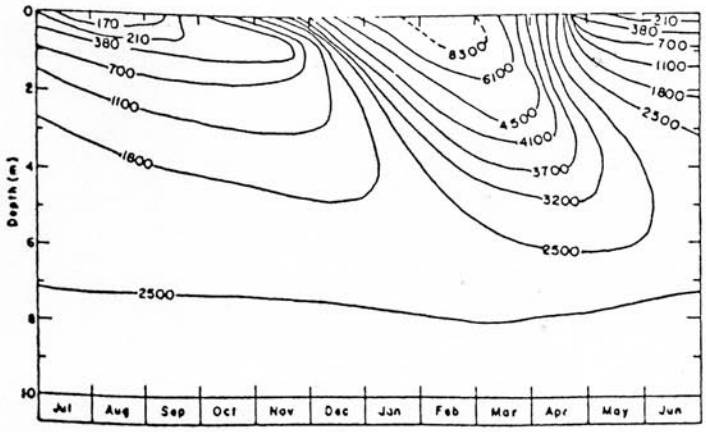


FIGURE 15. Computed vertical and temporal resistivity variations from data of Figure 14 – contoured in ohm-meters (after Arcone et al [29]).

northern climates we find that mineralogy, porosity, free water content, and ionic concentration within the free water are important resistivity factors as they are for temperate zones. In permafrost regions we have the additional complexity that small changes in temperature of the ground near 0°C may exert a large influence on terrain conductivity. The effect depends on the nature of the material and also the moisture content since as we have seen earlier even at temperatures substantially below 0°C considerable moisture may remain unfrozen in the case of clays whereas in the case of coarser material virtually all will be frozen. In short, ice content is a complicated function of many variables.

As an example of electrical layering arising due to temperature only consider Figure 14 which illustrates annual variations in ground temperature recorded near Fairbanks, Alaska. The region is in a discontinuous permafrost zone and subsurface material consists primarily of perennially frozen organic silt containing a varying amount of ground ice. From laboratory measurements on saturated organic silt to determine the variation of electrical resistivity with temperature, a plot of electrical resistivity with depth and time was derived [23] and is shown in Figure 15. We see from this figure that a resistivity range of 50 to 1 can occur as a result of temperature changes alone.

In the discontinuous zone of permafrost subsurface temperatures are subtly influenced by many variables and even in ground which is laterally uniform insofar as material type is concerned lateral temperature variations can bring about large changes in electrical resistivity as shown in Figure 16 where the survey traverse was taken over glacial lake basin sediments. The frozen areas outlined on the figure were derived from resistivity measurements and confirmed by drilling [24].

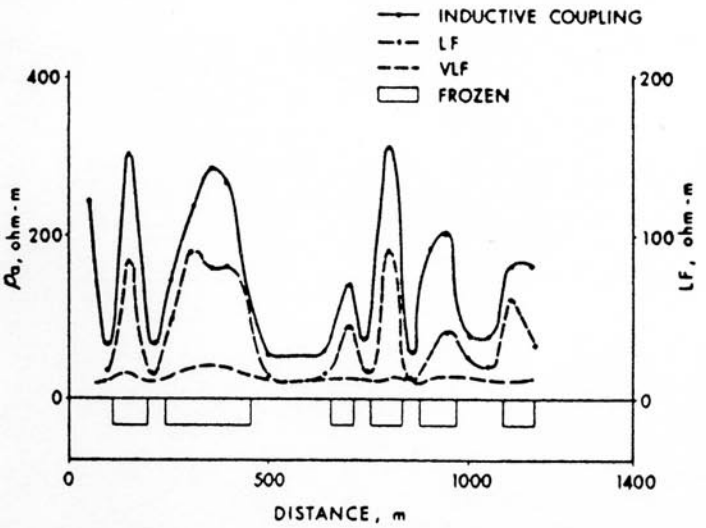


FIGURE 16. Results of the apparent resistivity measured with VLF (18.6 kHz), LF (375 kHz) radiohm and a magnetic induction instrument (EM31) over a section of shallow discontinuous permafrost (after P. Hoekstra [30]).

VI. SUMMARY

In this technical note we have discussed the concept of terrain conductivity, examined some of the properties of soils and rocks that affect their conductivity, and reviewed some measurements on typical terrain materials under a variety of climatic conditions.

To summarize, terrain conductivity is usually determined by one or more of the following parameters:

(1) clay content, clay type
(2) moisture profile with depth
(3) moisture salinity
(4) moisture temperature

Of these the most complex is usually the moisture profile, by which is meant the way in which (i) the porosity, (ii) the extent to which the pores are filled with water, and, (iii) the number, size and shape of interconnecting passages all vary with depth. The moisture profile is affected by material type (directly influencing porosity etc., or indirectly influencing permeability and water table location), topography (influencing the water table location), compaction (influencing porosity), and season (rates of precipitation, evaporation).

It is evident that many parameters may affect the ground conductivity. Fortunately at any given location relatively few are usually dominant however the survey interpreter should be aware of the possible alternatives. It is hoped that this brief treatment will be useful in assessing those parameters that are influential in the survey area and will thereby lead to a more accurate interpretation of survey data.

The bibliography gives a good indication of current interest in the electrical properties of rocks and soils and the curious reader will find much valuable material in the cited references.

BIBLIOGRAPHY

[1] Olhoeft, G.R. (1975) "Electrical Properties of Rocks". The Physics and Chemistry of Rocks and Minerals. pp 261–278. J. Wiley and Sons. N.Y.
[2] Olhoeft, G.R. (1977) "Electrical Properties of Natural Clay Permafrost". Can. J. Earth Sciences (14) pp 16–24.
[3] Ward, S.H., Fraser, D.C. (1967) "Conduction of Electricity in Rocks". Ch. 2. Mining Geophysics Vol. II. Society of Exploration Geophysicists, Tulsa, Oklahoma.
[4] Madden, T.R. (1976) "Random Networks and Mixing Laws". Geophysics (41, No. 6A) pp 1104–1125.
[5] Keller, G.V., Frischknecht, F.C. (1966) "Electrical Methods in Geophysical Prospecting". Ch. 1. Pergamon Press, N.Y.
[6] L.R. Webber, Ed. "Ontario Soils". Publication 492, Ministry of Agriculture and Food. Province of Ontario. Canada.
[7] Kirkham, D. (1964) "Soil Physics". Handbook of Applied Hydrology. Ch. 5. Chow, V.T., Ed. McGraw Hill, N.Y.
[8] Press, F., Siever, R. (1978) "Earth". Ch. 4. W.H. Freeman & Co., San Francisco.
[9] Maxey, G.B. (1964) "Hydrogeology". Handbook of Applied Hydrology. Ch. 4. Chow, V.T., Ed. McGraw Hill. N.Y.
[10] Millot, G. (1979) "Clay". Scientific American (240), 4, pp 109–118.
[11] Meyboom, P. (1967) "Hydrogeology". Groundwater in Canada. Ch. 2. Brown, I.C., Ed. Geol. Surv. Canada, Econ. Geol. Rept. 24.
[12] Todd, D.K. (1964) "Groundwater". Handbook of Applied Hydrology. Ch. 13. Chow, V.T. Ed. McGraw Hill, N.Y.
[13] Brown, I.C. (1967) "Introduction". Groundwater in Canada. Ch. 1. Brown, I.C., Ed., Geol. Surv. Canada. Econ. Geol. Rept. 24
[14] Heiland, C.A. (1968) "Geophysical Exploration". Ch. 10. Hafner Publishing Co. N.Y.
[15] Doherty, L.H. (1963) "Electrical Conductivity of the Great Lakes". J. Res. Natl. Bur. Stds. (67D), pp 765–771..
[16] Jackson, P.D., Taylor Smith, D., Stanford, P.N. (1978) "Resistivity –

Porosity – Particle Shape Relationships for Marine Sands". Geophysics (43) pp 1250–1268.
[17] Rhoades, J.D.; Raats, P.A.C.; Prather, R.S. (1976) "Effects of Liquid-Phase Electrical Conductivity, Water Content, and Surface Conductivity on Bulk Soil Electrical Conductivity". Soil Sci. Soc. of America Jour. (40) pp 651–665.
[18] Walker, J.W.; Hulse, W.H.; Eckart, D.W. (1973) "Observations of the Electrical Conductivity of the Tropical Soils of Western Puerto Rico". Geol. Soc. Amer. Bull. (84) pp 1743–1752.
[19] Olhoeft, G.R. Private Communication.
[20] Hoekstra, P.; McNeill, J.D. (1973) "Electromagnetic Probing of Permafrost". Proc. Second Intl. Conference on Permafrost. Yakutsk, USSR. pp 517–526.
[21] Grant, F.S.; West, G.F. (1965) "Interpretation Theory in Applied Geophysics". Ch. 13. McGraw Hill, N.Y.
[22] Telford, W.M.; Geldart, L.P.; Sheriff, R.E.; Keys, D.A. (1976) Applied Geophysics Ch. 5. Cambridge Univ. Press, N.Y.
[23] Culley, R.W.; Jagodits, F.L.; Middleton, R.S. (1975) "E-Phase System for Detection of Buried Granular Deposits. Symposium on Modern Innovations in Subsurface Exploration". 54th Annual Meeting of Transportation Research Board.
[24] Sellmann, P.V.; Arcone, S.A.; Delaney, A. (1976) "Preliminary Evaluation of New LF Radiowave and Magnetic Induction Resistivity Units – Over Permafrost Terrain". Natl. Res. Council Canada Tech. Mem. 119. Proc. Symposium on Permafrost Geophysics. 12 Oct.
[25] Smith-Rose, R.L. (1934) "Electrical Measurements on Soil with Alternating Currents". Proc IEE No. 75 pp 221–237.
[26] Meillon, J.J. (1978) "Economic Geology and Tropical Weathering". Can. Inst. Mining and Metallurgy (CIM) Bulletin, July. pp 61–69.
[27] Palacky, G.J.; Kadekaru, K. (1979) "Effect of Tropical Weathering on Electrical and Electromagnetic Measurements". Geophysics (44) pp 69–88.
[28] Rhoades, J.D.; Halvorson, A.D. (1977) "Electrical Conductivity Methods for Detecting and Delineating Saline Seeps and Measuring Salinity in Northern Great Plains Soils". Agricultural Research Service Dept. ARS W-42 U.S. Dept. of Agriculture. Western Region.
[29] Arcone, S.A.; Sellman, P.; Delaney, A. (1979) "Effects of Seasonal Changes and Ground Ice on Electromagnetic Surveys of Permafrost". USA CRREL Report. U.S.A. Cold Regions Research & Engineering Labs. Hanover, New Hampshire, U.S.A.
[30] Hoekstra, P. (1978) "Electromagnetic Methods for Mapping Shallow Permafrost". Geophysics (43) pp 782–787.

REFERENCES NOT CITED BUT USEFUL

[31] Morley, L.W., Ed. (1967) "Mining and Groundwater Geophysics". Geological Survey of Canada. Econ. Geol. Dept. No. 26.
[32] Wilcox, S.W. (1944) "Sand and Gravel Prospecting by the Earth Resistivity Method". Geophysics (9) pp 36–45.
[33] Kelly, S.F. (1962) "Geophysical Exploration for Water by Electrical Resistivity". Jour. New England Water Works Assoc. (76) pp 118–189.

APPENDIX B
Geonics Technical Note 6

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Technical Note TN-6

ELECTROMAGNETIC TERRAIN CONDUCTIVITY MEASUREMENT at LOW INDUCTION NUMBERS

JD McNEILL

October, 1980

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I. INTRODUCTION

The measurement of terrain resistivity to map geology has been utilized for over half a century. Several shortcomings, however, have prevented this technique from being widely accepted for engineering purposes. The first of these is that conventional galvanic resistivity surveys require a relatively large amount of manpower to execute and are thus expensive. Secondly, the actual value of resistivity itself is seldom diagnostic; it is the lateral or vertical variations of resistivity which form the basis of any interpretation. However the high cost of resistivity surveying generally means that fewer measurements are made than would be desirable, with the result that either (i) the survey area is not made large enough to establish a reasonable background against which the anomalous areas are to be delineated or (ii) the anomalous area itself is obscure and lacks definition.

An additional problem inherent to conventional resistivity techniques is that although the effective depth of exploration is determined by the selected inter-electrode spacing, resistive inhomogeneities which are small compared to this depth but which are located near the potential electrodes can cause a significant error in the measurement. Such fluctuations in the measured results are truly geological "noise" because it is not possible to determine the physical size, resistivity contrast, or location of the source. As a result of such inhomogeneities resistivity profiles carried out at constant interelectrode spacing tend to be noisy, limiting the resolution in resistivity that can be achieved, even though the instrumentation itself is capable of producing much higher accuracy.

It was an awareness of both the advantages of resistivity for engineering geophysical surveys and the disadvantages of conventional resistivity techniques that led Geonics Limited to examine the possibility of employing electromagnetic (inductive) techniques as an alternative for resistivity surveys. With the development of the EM31 and the EM34-3 it is now possible to map terrain conductivity virtually as fast as the operator(s) can walk; furthermore the sample volume is averaged in such a manner as to yield unexcelled resolution in conductivity.

These patented instruments have been designed to cover the range of depths generally useful for engineering geophysics; the EM31, one-man portable, has an effective depth of approximately 6 meters and the EM34-3, two-man portable, has stepwise selectable depths from 7.5 meters to a maximum of 60 meters.

Typical applications for the EM31 and EM34-3 instrumentation are:

(i) Delineating regions of permafrost (frozen pore water)
(ii) Locating gravel
(iii) Extending known gravel deposits
(iv) Mapping saline intrusions
(v) Detecting cavities in carbonate rocks
(vi) Mapping pollution plumes in groundwater
(vii) Mapped bedrock topography
(viii) Mapping terrain conductivity for electrical grounding
(ix) General geological mapping (soil types, fault and fracture zones, etc.)
(x) Archaeological exploration
(xi) Locating pipes (EM31) and metallic-type conductors

This technical note describes both the principles and the instrumentation employed to measure terrain conductivity using electromagnetic techniques at low induction numbers. For a detailed discussion of the concept of terrain resistivity/conductivity and of the various factors that control this parameter the reader is referred to Geonics Limited Technical Note "Electrical Conductivity of Soils and Rocks".

II. PRINCIPLE OF OPERATION

The application of electromagnetic techniques to the measurement of terrain resistivity, or more properly, conductivity* is not new and excellent descriptions of this technique are given in the literature [1], [2].

*Conductivity is preferred with inductive techniques since the response is generally proportional to conductivity and inversely proportional to resistivity.

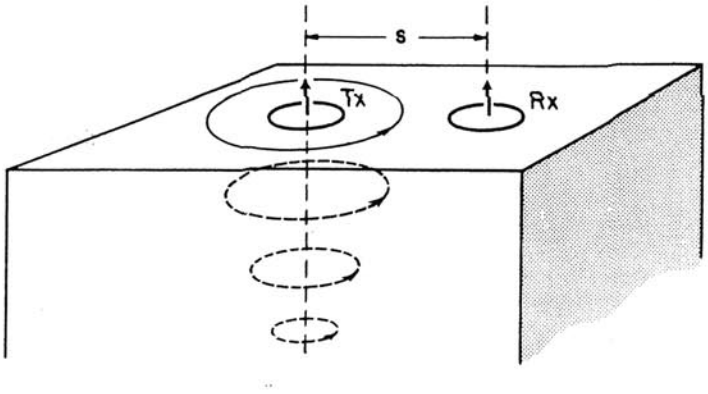


FIGURE 1. Induced current flow (homogeneous halfspace).

Consider Figure 1 in which a transmitter coil Tx energized with an alternating current at an audio frequency, is placed on the earth (assumed uniform) and a receiver coil Rx is located a short distance s away. The time-varying magnetic field arising from the alternating current in the transmitter coil induces very small currents in the earth. These currents generate a secondary magnetic field H_s which is sensed, together with the primary field, H_p, by the receiver coil.

In general this secondary magnetic field is a complicated function of the intercoil spacing s, the operating frequency, f, and the ground conductivity σ. Under certain constraints, technically defined as "operation at low values of induction number" (and discussed in detail in the appendix) the secondary magnetic field is a very simple function of these variables. These constraints are incorporated in the design of the EM31 and EM34-3 whence the secondary magnetic field is shown to be:

$$\frac{H_s}{H_p} \simeq \frac{i\omega\mu_o\sigma s^2}{4} \qquad (1)$$

where H_s = secondary magnetic field at the receiver coil
H_p = primary magnetic field at the receiver coil
$\omega = 2\pi f$
f = frequency (Hz)
μ_o = permeability of free space
σ = ground conductivity (mho/m)
s = intercoil spacing (m)
$i = \sqrt{-1}$

The ratio of the secondary to the primary magnetic field is now linearly proportional to the terrain conductivity, a fact which makes it possible to construct a direct-reading, linear terrain conductivity meter by simply measuring this ratio. Given H_s/H_p the apparent conductivity indicated by the instrument is defined from equation (1) as

$$\sigma_a = \frac{4}{\omega\mu_o s^2}\left(\frac{H_s}{H_p}\right) \qquad (2)$$

The MKS units of conductivity are the mho (Siemen) per meter or, more conveniently, the millimho per meter.

III. INSTRUMENTATION

The EM31 (shown in Figure 2) has an intercoil spacing of 3.7 meters, which yields an effective depth of exploration of about 6 meters. The instrument can also be operated on its side, in which

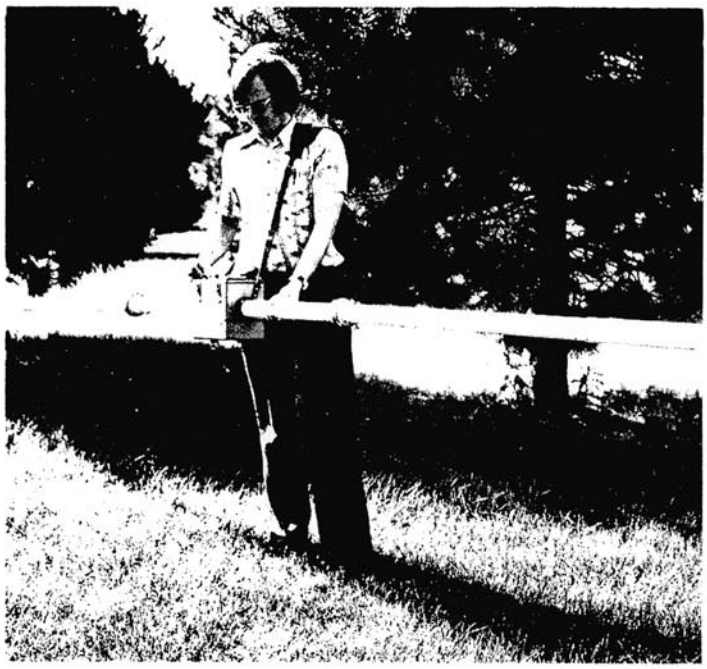


FIGURE 2. EM31 in field operation.

case as will be seen in Section IV., the effective depth of exploration is reduced to approximately 3 meters. The instrument is one-man portable and can be used either in "station-by-station" mode or read continuously. The presence of layering in the earth can be detected by raising the instrument and noting the readings as a function of instrument height. If the earth is two-layered the conductivity of both layers and the upper layer thickness can be resolved.

The EM34-3 which is two-man portable has the two coils flexibly connected (Figure 3). The intercoil spacing is measured electronically so that the receiver operator simply reads a meter to accurately set the coils to the correct spacing, which can be 10, 20, or 40 meters so as to directly vary the effective depth of exploration as shown in Table 1.



FIGURE 3. EM34-3 in field operation.

TABLE 1. Exploration depths for EM34-3 at various intercoil spacings

Intercoil Spacing (meters)	Exploration Depth (meters)	
	Horizontal Dipoles	Vertical Dipoles
10	7.5	15
20	15	30
40	30	60

To measure terrain conductivity the transmitter operator stops at the measurement station; the receiver operator moves the receiver coil backwards or forwards until his meter indicates correct intercoil spacing and he reads the terrain conductivity from a second meter. The procedure takes 10 to 20 seconds. The coils are normally carried with their planes vertical (horizontal dipole mode) since in this configuration the measurement is relatively insensitive to misalignment of the coils. In the event that the greater depth of penetration resulting when the two coils are in the vertical dipole mode is desired, more care must be taken with intercoil alignment. Because of the relatively short intercoil spacing correct alignment is usually not difficult to achieve.

Both instruments are calibrated to read terrain conductivity in millimhos per meter. To convert these readings to resistivity (in ohmmeters) one simply divides them into 1,000, i.e. 50 millimhos per meter is the equivalent of 20 ohmmeters.

IV. SURVEY TECHNIQUES AND INTERPRETATION

For either the EM31 or EM34-3 it can be shown that in a homogeneous or horizontally stratified earth the current flow is entirely horizontal. Furthermore under the constraints by which the instruments are designed the current flow at any point in the ground is independent of the current flow at any other point since the magnetic coupling between all current loops is negligible. Finally, under these constraints the depth of penetration is limited only by the intercoil spacing. We say that the depth of penetration is "source" or "geometry" limited rather than "skin depth" limited since it is now controlled by the fall-off with distance of the dipolar transmitter field. For this reason all dimensions are normalized with respect to the intercoil spacing in subsequent sections of this technical note.

IV. 1. Instrumental Response as a Function of Depth (Homogeneous Halfspace)

Consider a homogeneous halfspace on the surface of which is located an EM31 or an EM34-3 transmitter as shown in Figure 4. Fixing our attention on a thin layer of thickness dz at depth z (where z is the depth divided by the intercoil spacing s) it is possible to calculate the secondary magnetic field in the receiver coil arising from all of the current flow within this or any other horizontal thin layer. One can thus construct the function $\phi_V(z)$ shown in Figure 4 which describes the relative contribution to the secondary magnetic field arising from a thin layer at any depth z. We see from this figure that material located at a depth of approximately 0.4 s gives maximum contribution to the secondary magnetic field but that material at a depth of 1.5 s still contributes significantly. It is interesting to note that the ground at zero depth, i.e. the near surface material,

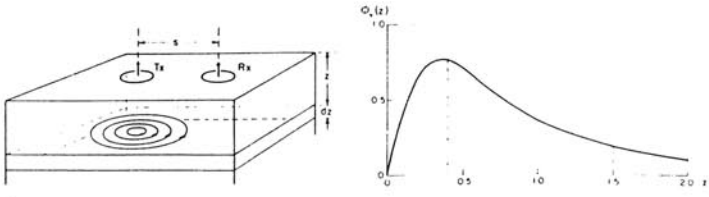


FIGURE 4. Relative response versus depth for vertical dipoles. $\phi_v(z)$ is the relative contribution to H_s from material in a thin layer dz located at (normalized) depth z.

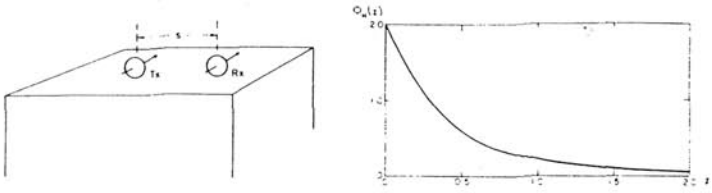


FIGURE 5. Relative response versus depth for horizontal dipoles

makes a very small contribution to the secondary magnetic field and therefore this coil configuration is insensitive to changes in near surface conductivity.

Figure 5 illustrates the function of Figure 4 for the case of both transmitter and receiver dipoles horizontal coplanar rather than vertical coplanar. For the coil configuration of Figure 5 (commonly used for the EM34-3 since it is less critical to intercoil alignment) the relative contribution from material near-surface is large and the response falls off monotonically with depth.

A comparison of the function ϕ for both coil configurations in Figure 6 emphasizes the different manner in which they respond to material at different depths. The difference is important since either instrument can be rolled over so that the vertical dipole transmitter/receiver geometry becomes a horizontal dipole transmitter/receiver geometry and vice versa. As will be seen later, this feature is useful in diagnosing and defining a layered earth. The figure also shows that for regions greater than one intercoil spacing in depth the vertical transmitter/receiver dipole gives approximately twice the relative contribution of the horizontal transmitter/receiver dipole.

To summarize, with either horizontal or vertical transmitter/receiver dipole orientation it is possible to construct a function which gives the relative response to the secondary magnetic field at the receiver from a thin layer of ground at any depth. That this is possible arises from the fact that (i) all current flow is horizontal and (ii) all current loops are independent of all other current loops. It should be noted that it is not possible to construct such functions for conventional resistivity techniques.

Finally, since as shown in Section II the definition of apparent conductivity is given in terms of the secondary magnetic field at the receiver, the functions in Figure 6 also give the relative contribution from material at different depths to the *apparent conductivity* indicated by the instrument meter. The integral of either function from zero to infinity gives the total secondary magnetic field at the receiver coil from a homogeneous halfspace which is directly related to the electrical conductivity of the halfspace by equation (1). It is therefore possible to state with great precision the relative influence of material at different depths to the indicated apparent conductivity.

IV. 2. Multi-Layered Earth Response

The functions shown in Figure 6 are useful for describing the relative sensitivity of either of the two coil configurations to material at various depths. However a function derived from them is more useful for performing calculations. It is defined as the relative contribution to the secondary magnetic field or apparent conductivity from all material below a depth z and is given by

$$R_{\underset{H}{V}}(z) = \int_z^\infty \phi_{\underset{H}{V}}(z)dz \qquad (3)$$

Called the cumulative response, this function is illustrated in Figure 7 for vertical coplanar transmitter/receiver dipoles. The figure shows, for example, that for this configuration all material below a depth of two intercoil spacings yields a relative contribution of approximately 0.25 (i.e. 25%) to the secondary magnetic field at the receiver coil.

Suppose now that our homogeneous halfspace has a conductivity of 20 millimhos per meter (50 ohmmeters). The equipment having been calibrated according to equation (2), the output meter indicates 20 millimhos per meter. From Figure 7 we observed that the material below two intercoil spacings contributed 25% to the secondary magnetic field and therefore 25% to the indicated meter reading. Suppose that we replace this deep material with an infinitely resistive (zero conductivity) substance. Since we have reduced to zero the 25% that this material contributed to the meter reading the new reading will be 75% of 20, or 15 millimhos per meter. Conversely, if we leave all of the material below two intercoil spacings at 20

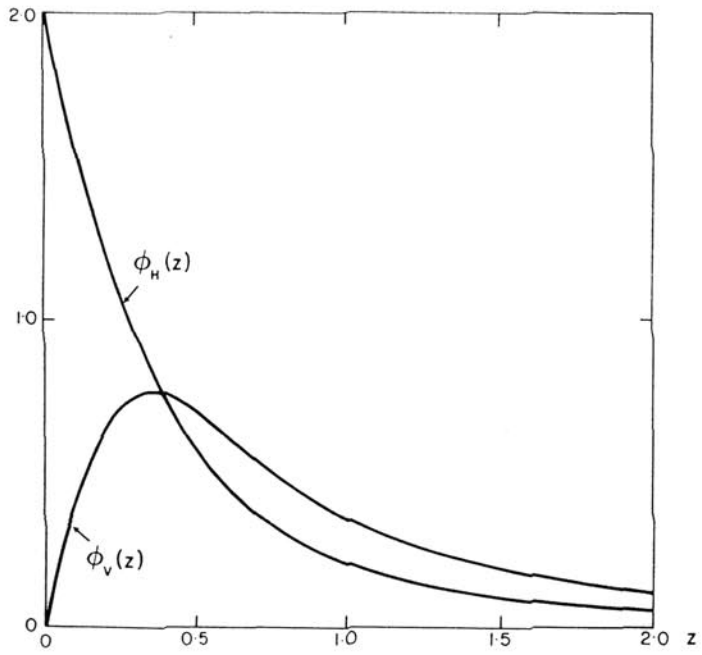


FIGURE 6. Comparison of relative responses for vertical and horizontal dipoles.

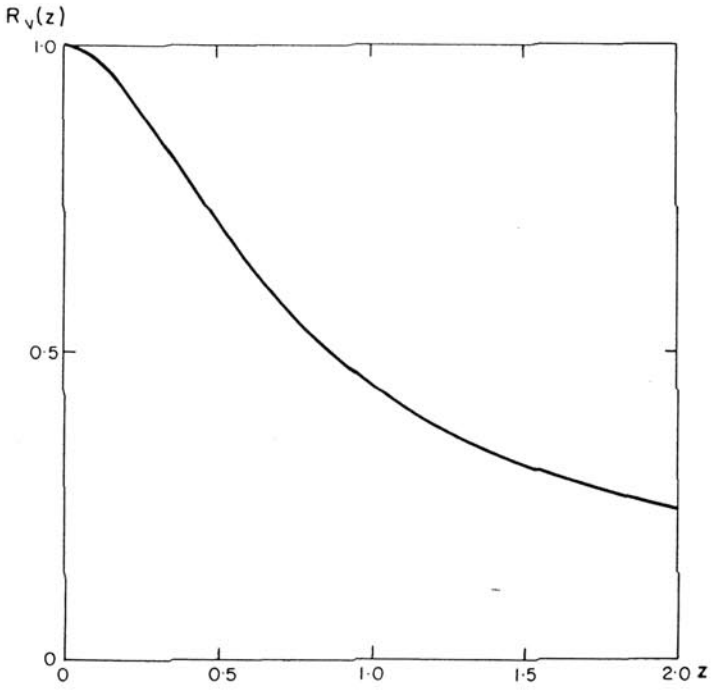


FIGURE 7. Cumulative response versus depth for vertical dipoles. $R_V(z)$ is the relative contribution to H_s from all material below a (normalized) depth z.

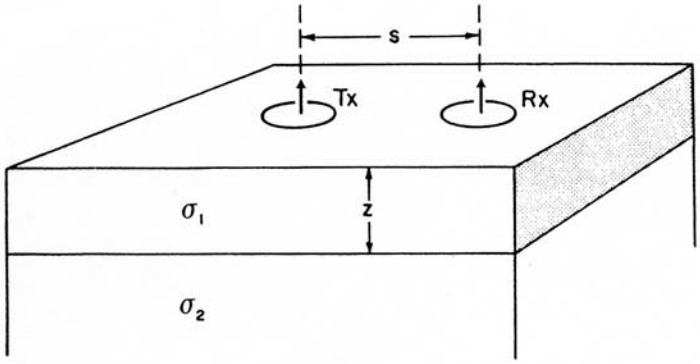


FIGURE 8. Two layer earth model.

millimhos per meter but make all material above two intercoil spacings infinitely resistive the meter reading will fall from the original 20 millimhos per meter for the homogeneous half space to 5 millimhos per meter, since, if all of the material below two intercoil spacings contributed 25% of the meter reading, all of the material above two intercoil spacings must contribute 75%; when removed the meter reading becomes 0.25×20 or 5 millimhos per meter.

From this example we see that there is a simple way to calculate the instrument reading on an arbitrarily layered earth as long as the intercoil spacing is much less than the skin depth in all of the layers. We simply add the contribution from each layer independently, weighted according to its conductivity and depth according to Figure 7. For example assume that we have a two-layer case as shown in Figure 8. The contribution from the upper layer is given by

$$\sigma_a = \sigma_1[1 - R_V(z)] \tag{4a}$$

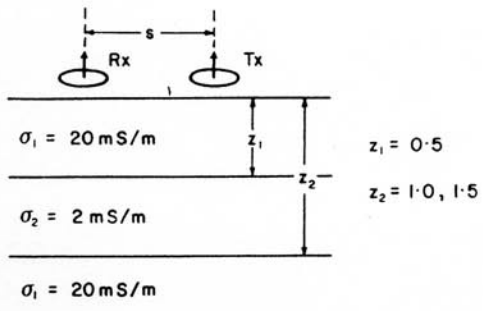
since all of the material below zero depth yields a relative contribution of unity or 100% to the meter reading. Conversely all of the material in the lower layer adds a contribution given by

$$\sigma_a = \sigma_2 R_V(z) \tag{4b}$$

and the actual instrument reading will therefore be the sum of these two quantities

$$\sigma_a = \sigma_1[1 - R_V(z)] + \sigma_2 R_V(z) \tag{5}$$

If the earth is three-layered as shown in Figure 9 the same procedure is employed to determine the instrumental response. In this example the calculations are performed for different middle layer thicknesses.



$$\sigma_0 = \sigma_1[1 - R(z_1)] + \sigma_2[R(z_1) - R(z_2)] + \sigma_3 R(z_2)$$

$z_2 = 1{\cdot}0$, $\sigma_0 = 20[1 - 0{\cdot}70] + 2[0{\cdot}70 - 0{\cdot}44] + 20 \times 0{\cdot}44 = 15{\cdot}3$ mmho/m

$z_2 = 1{\cdot}5$, $\sigma_0 = 20[1 - 0{\cdot}70] + 2[0{\cdot}70 - 0{\cdot}32] + 20 \times 0{\cdot}32 = 13{\cdot}2$ mmho/m

FIGURE 9. Calculation of response to three layer earth – center layer thickness varying.

The ease with which such calculations are performed facilitates survey preparation and interpretation. It is sometimes possible to make advance estimates of the electrical properties of the materials to be encountered during a survey or, alternatively, once on-site the operator can obtain the same information from sample measurements of the different materials. The procedures outlined above are then employed to estimate the apparent conductivity measured under various terrain conditions. Examples of such calculations for the EM31 are shown in Figure 10. As is seen in the appendix the algebraic expressions for $\phi(z)$ and $R(z)$ are very simple and are easily programmed on hand held calculators.

In Figure 10 the vertical dimensions are greatly exaggerated with respect to the horizontal dimensions. The question arises as to what degree of lateral uniformity is required before the earth can be considered as horizontally stratified or homogeneous. Survey experience indicates that if the ground conductivity does not significantly vary with horizontal distance within a radius of one intercoil spacing from the instrument the ground can be considered to be laterally uniform.

The above discussion referred to the use of vertical transmitter/receiver dipoles; it is equally possible to construct a cumulative response function for the horizontal coplanar dipole configuration and Figure 11 illustrates this function for both coil configurations. A comparison of the two curves illustrates that the vertical dipole mode of operation has approximately twice the effective exploration depth of the horizontal dipole mode.

IV. 3. Comparison with Conventional Resistivity Techniques

Many readers will be familiar with the two-layer curves employed to interpret data from conventional resistivity surveys using a Wenner array of four equally spaced electrodes. Using the techniques described in the previous section it is a simple matter to calculate two-layer curves for the electromagnetic technique; Figure 12 shows such curves for both the vertical and horizontal dipole configurations superimposed on standard Wenner curves. The general shape is similar but there are marked differences in detail. For vertical coplanar transmitter/receiver dipoles we see that when the substrate is the more resistive the response of the two systems is similar; however when the substrate is the more conductive the electromagnetic technique sees deeper in that the influence of the substrate, for a given conductivity contrast, is felt at smaller intercoil spacing than inter-electrode spacing. This is a general characteristic of electromagnetic systems which prefer to look through an insulator to a conductor rather than through a conductor to an insulator.

For the horizontal dipole configuration if the lower layer is the more resistive the effective exploration depth of the inductive technique is slightly less than the Wenner array; however, once again, in the case where the lower layer is the more conductive the exploration depth of the inductive technique is substantially greater.

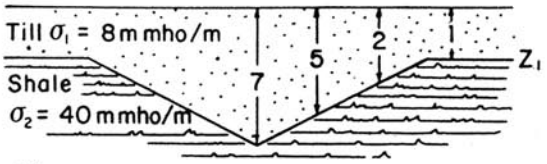
IV. 4. Resolution of Two-Layered Earth by Varying Intercoil Spacing

The principal advantage of the inductive electromagnetic technique over conventional resistivity lies in the speed and accuracy with which lateral changes of terrain conductivity can be measured. However this technique can also be used to measure the vertical variation of conductivity by expanding the intercoil spacing in a manner analogous to that in which the electrode spacing is expanded in conventional resistivity sounding techniques. The current state-of-the-art, however, is such that relatively few intercoil spacings can be employed; for example the EM34-3 can be operated with an intercoil spacing of 10, 20 or 40 meters. This feature is somewhat mitigated by the fact that the instruments can be used in either the vertical or horizontal dipole modes which, as shown in a previous section, exhibit different sensitivity to various depths thus yielding more information than would be available by simply using three spacings with one coil orientation.

To interpret a two-layer geometry the two-layer curves for both dipole configurations are superimposed on a common plot as shown

CROSS-SECTIONS

BURIED RIVER VALLEY

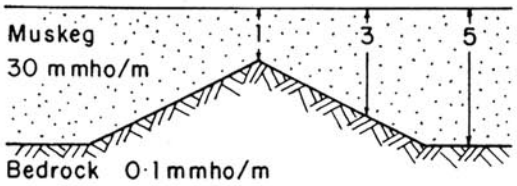


$$\frac{\sigma_a}{\sigma_1} = 1 - R(Z_1) + k_2 R(Z_1)$$

$$k_2 = \frac{\sigma_2}{\sigma_1} = \frac{40}{8} = 5$$

Z_1 (m)	σ_a (mmho/m)
1	32·6
2	26·9
5	18·6
7	16·0

BEDROCK HIGH

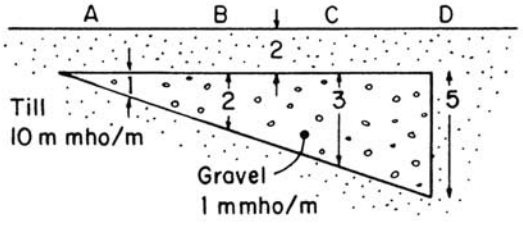


$$\frac{\sigma_a}{\sigma_1} = 1 - R(Z_1) + k_2 R(Z_1)$$

$$k_2 = \frac{\sigma_2}{\sigma_1} = \frac{0{\cdot}1}{30} = 0{\cdot}0033$$

Z_1 (m)	σ_a (mmho/m)
1	6·9
3	15·9
5	20·1

GRAVEL DEPOSIT



$$\frac{\sigma_a}{\sigma_1} = 1 - R(Z_1) + k_2[R(Z_1) - R(Z_2)] + k_3 R(Z_2)$$

$$k_2 = \frac{\sigma_2}{\sigma_1} = \frac{1}{10} = 0{\cdot}10$$

$$k_3 = \frac{\sigma_3}{\sigma_1} = 1{\cdot}00$$

station	σ_a (mmho/m)
A	8·9
B	8·2
C	7·7
D	6·9

FIGURE 10. EM31 calculated response across various geological features, using R (Z) corrected for instrument operation at waist (1 meter) height. Coil separation s = 3.67 meters.

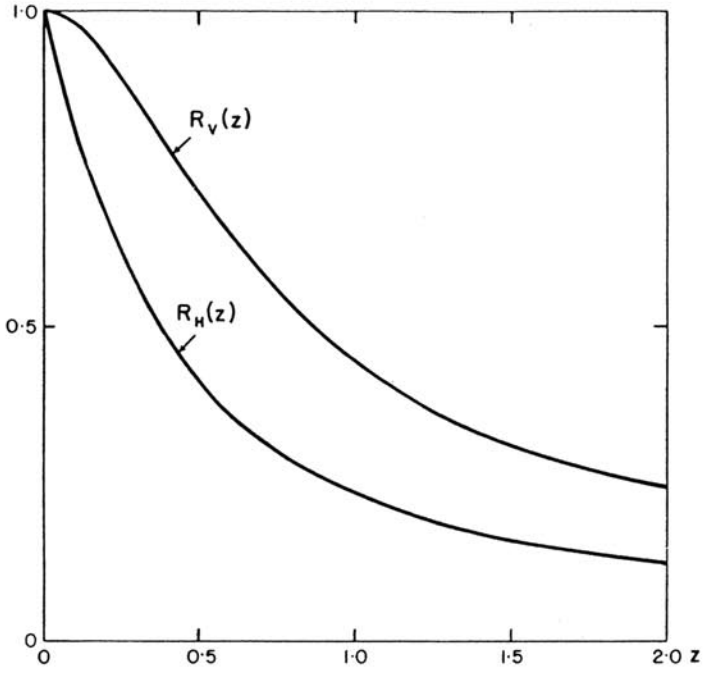


FIGURE 11. Cumulative response versus depth for vertical and horizontal dipoles.

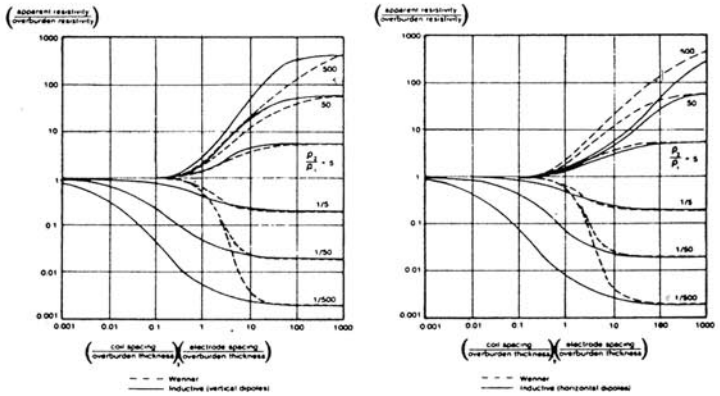


FIGURE 12. Comparison of Wenner array and inductive electromagnetic sounding curves for a two layer earth.

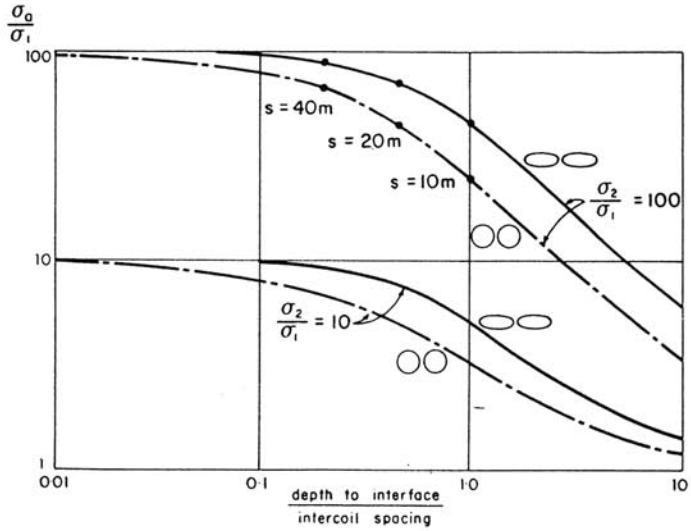


FIGURE 13. Two layer earth response curves (σ_2/σ_1 = 10,100; intercoil spacing varied). Dots indicate typical survey results.

in Figure 13. The six data points obtained by making measurements with two coil orientations and three intercoil spacings are plotted to the same scale on a piece of transparent paper and are translated vertically and horizontally on the two-layer curves to ascertain whether a satisfactory fit can be achieved. In the event that such a fit can be made, the earth does exhibit two-layer characteristics and the values of conductivity for both layers and the thickness of the upper layer are directly read off.

IV. 5. Resolution of Two-Layered Earth by Varying Instrument Height

In the case of the EM31 the intercoil spacing is rigidly fixed so that the technique described above is not available to analyse a layered earth. It is, however, possible to raise the instrument above the ground, measuring the apparent conductivity as a function of instrument height for both the vertical and horizontal dipole configurations. This has the effect of shifting the response curves of Figure 6 upwards through the various regions of the earth and the variation of apparent conductivity with height is therefore of diagnostic value in determining the nature of any layering. It is a straightforward matter to calculate the response of the instrument as a function of height for various two-layered earth geometries and typical curves are shown in Figure 14b. To use the curves one simply plots the measured apparent conductivity versus height for both coil configurations on a piece of transparent paper to the same scale as Figure 14b and shifts the plotted data vertically until good agreement is achieved with one of the curves, whereupon the two conductivities and the upper layer thickness are immediately determined as in the illustrated case history of Figure 14c.

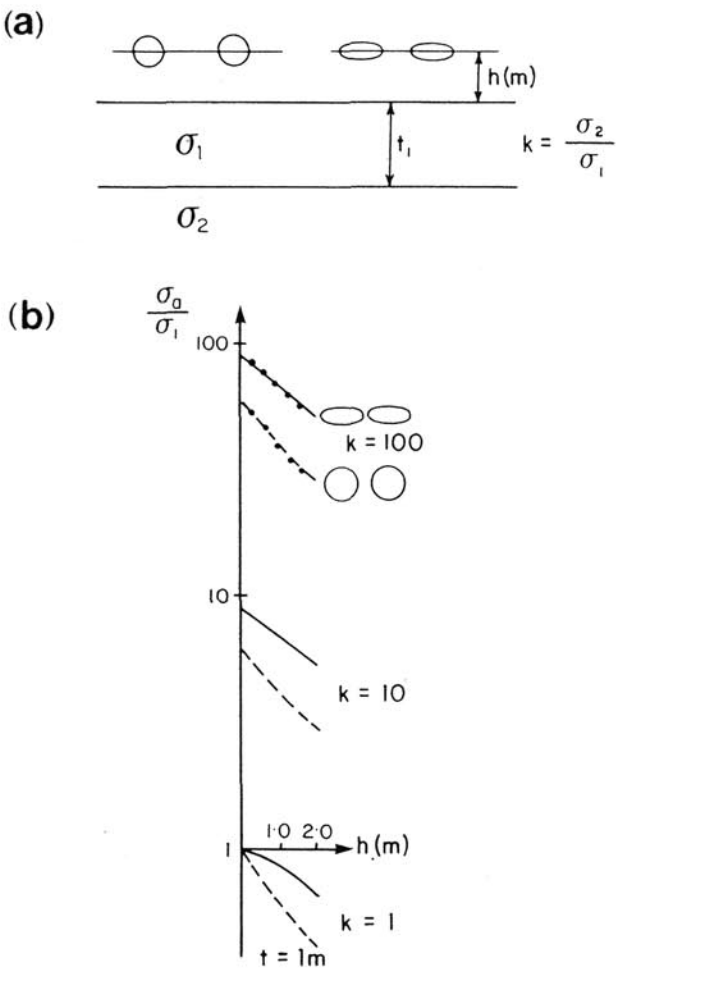


FIGURE 14. Two layer earth response curves (σ_2/σ_1 = 1, 10, 100; instrument height varied). Dots are actual survey results.

In the event that the conductivity of either one of the two layers is known to be much less than the other, so that its contribution to the meter reading is negligible, it is simply necessary to lay the instrument on the ground, take a reading, lay it on its side, take a second reading, and from these two values one can immediately calculate the conductivity of the more conductive layer and the thickness of the upper layer.

V. ADVANTAGES AND DISADVANTAGES OF INDUCTIVE TERRAIN CONDUCTIVITY MEASUREMENTS

V. 1. Advantages

The advantages of the use of inductive electromagnetic techniques to measure terrain conductivity are as follows:

(i) *Excellent resolution in conductivity.* It was stated in Section I that a problem with conventional resistivity was that the presence of localized resistivity inhomogeneities near the potential electrodes caused large errors. If we examine the current flow in a homogeneous halfspace for the inductive technique described herein we realize that in the vicinity of the transmitter the current density is very high and we might expect the presence of a conductive inhomogeneity located here to have a large effect. However where the current density is high, the radius of the current loops is small and their distance from the receiver coil large, so that these loops do not couple well magnetically with the receiver. The effect of changing this current by varying the local conductivity is consequently negligible. The lateral extent of the volume of earth whose conductivity is sensed by the inductive technique is approximately the same as the vertical depth. The result is that small changes in conductivity, for example of the order of 5% or 10%, are easily and accurately measured.

(ii) *No current injection problems.* Since currents are magnetically induced in the earth, current injection problems encountered with conventional resistivity in materials such as gravel, bedrock, permafrost, snow and ice, etc., are not encountered with this type of instrumentation.

(iii) *Simple multi-layered earth calculations.* This matter is dealt with at length in Section IV.

(iv) *Easy, rapid measurements.* A problem with the conventional Wenner array is that in order to survey to an effective depth a the array must be 3a in length and the total length of wire required 4a, used in four sections. This presents many opportunities for snagging and breaking the wire. Furthermore each measurement requires insertion of four electrodes and relatively careful measurement of the inter-electrode spacing. These features are avoided with the inductive electromagnetic techniques and it is no exaggeration to say that a survey can often be carried out five to ten times faster using this technique. Indeed with either the EM31 or the EM34-3 it is usually possible under average terrain conditions to survey 5 to 7 line-kilometers a day with a station spacing of 25 or 50 meters.

V. 2. Disadvantages

As with all geophysical instruments, there are some limitations and disadvantages to the use of inductive electromagnetic techniques and these are as follows:

(i) *Limited dynamic range (1 – 1000 mmhos per meter).* At low values of terrain conductivity it becomes difficult to magnetically induce sufficient current in the ground to produce a detectable magnetic field at the receiver coil. Conversely at high values of conductivity the quadrature component of the received magnetic field is no longer linearly proportional to terrain conductivity as is shown in the appendix.

(ii) *Setting and maintaining the instrument zero.* Ideally in order to set the zero the instrument would be suspended in free space

and the zero set there. The more acceptable alternative is to search out a region of very resistive ground, to accurately measure its conductivity using conventional techniques, and to set the instrumental zero at that location. This is the procedure which is actually followed.

It is necessary that this zero be accurately maintained over long periods of time and over the wide variations of temperature encountered during geophysical survey in various parts of the world. This produces tight constraints on the circuitry, with the result that the zero may be in error by up to ±0.2 mmhos per meter. Such an error would be negligible over the usual range of terrain conductivities; however in the event that measurements are being made on highly resistive ground the zero error can become significant.

(iii) *Limited Vertical Sounding Capability*. In theory it is possible to use a system such as the EM34-3 at a continuum of intercoil spacings to yield more information about electrical layering in the ground. To achieve a wide variety of inter-electrode spacings with conventional resistivity equipment is simple; in the case of the inductive electromagnetic technique the rapid fall-off of the magnetic field from the dipole transmitter introduces a serious dynamic range problem. In due course there will undoubtedly be instrumentation with a wider variety of spacings at the expense of additional complexity.

VI. CASE HISTORIES

This section describes several case histories obtained with the EM31 and the EM34. The surveys (i) illustrate the resolution in conductivity that can be achieved, (ii) compare the results obtained with conventional resistivity and (iii) illustrate the use of the latter for locating sand, gravel and conductive minerals, determining bedrock topography (including locating a buried river channel) and mapping the pollution plume from a land-fill site. In some cases the indicated conductivity has been converted to resistivity to facilitate comparison with conventional resistivity survey results.

Case History #1

Location: Mississauga, Ontario
Instrument: EM31
Application: Illustrates resolution and repeatability of EM31

For this case history a Rustrak chart recorder was used to monitor the output of an EM31. A line of length 200 meters was traversed in a field in both easterly and westerly directions. Figure 15 demonstrates that the instrument is resolving conductivity changes of less than 1 mmho/m (1% of full scale deflection) and that the repeatability is of the same order. In fact the repeatability is limited in this case by the resolving power of the chart recorder itself. It should furthermore be noted that the instrument is detecting spatial changes in conductivity of a few meters in length – compatible with the intercoil spacing of 3.7 meters.

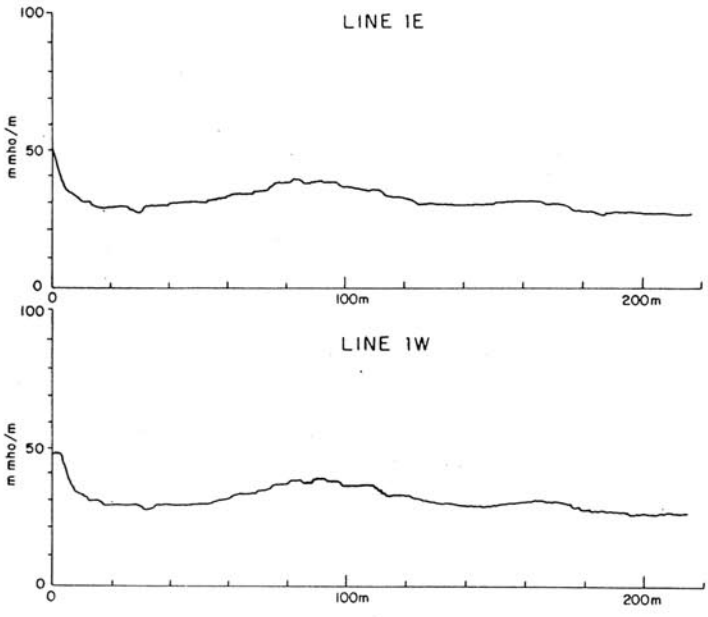


FIGURE 15.

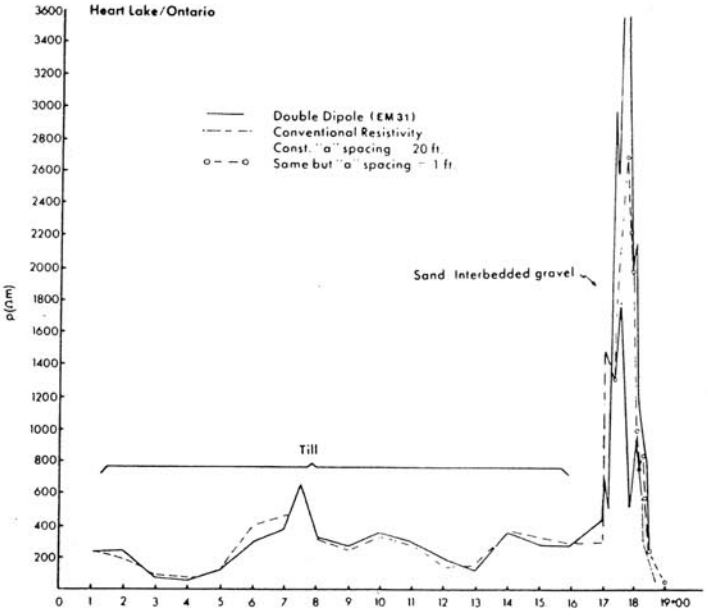


FIGURE 16. Test survey line – Heart Lake, Ont.

Case History #2

Location: Hearth Lake, Ontario
Instruments: EM31
Conventional resistivity apparatus
Application: Location of sand/gravel
Comparison of EM31 and conventional resistivity

In this survey a line 1900 ft. (580 meters) in length was surveyed with a measurement interval of 100 ft. (30 meters). The survey area was generally located on a buried esker, however the last few survey stations, 17 + 00 to 19 + 00, traversed a region of exposed sand and gravel (often occurring in the form of concretions) and over this portion of the line measurements were made every 10 ft. (3.0 meters).

The conventional resistivity profile was carried out using a Wenner array with an a spacing of 20 ft. (6.1 meters) except between stations 17 + 00 and 19 + 00 where the a spacing was reduced to 1 ft. (0.30 meters).

In general the correlation between the two sets of data is excellent, and demonstrates the ability of the EM31 to generate good quantitative data even in regions of low conductivity. Over the esker the EM31 was actually read continuously down the line – the data was recorded only at the 100 ft. intervals, with the exception of the reading at station 7 + 50 which was also recorded since it was noted that a conductivity low occurred there. Such an anomaly was, of course, missed by the conventional resistivity where measurements were only made every 100 ft.

Both sets of data become rather erratic between stations 17 + 00 and 19 + 00 as a result of the very rapid lateral changes in resistivity arising from the concreted material referred to above.

Case History #3

Location: Cavendish, Ontario.
Instrument: EM31
Application: Location of metallic type conductors

This survey line, of length 2000 ft. (610 meters), is located at a site

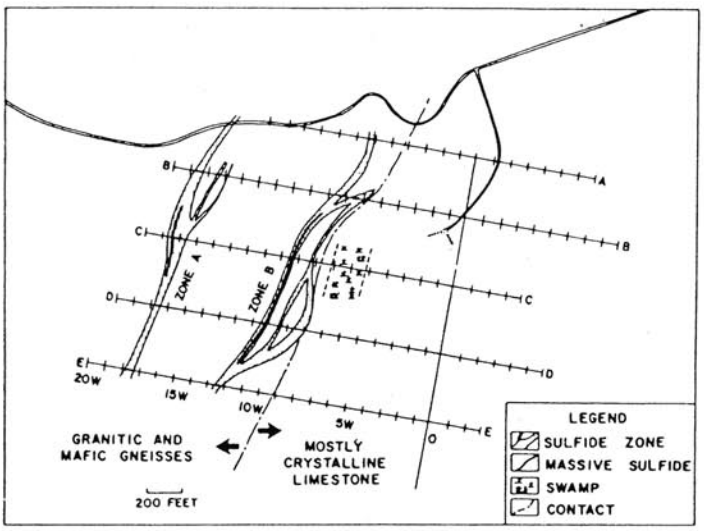


FIGURE 17. Geologic map of the Cavendish test site and the grid of traverse lines used in geophysical studies (after Ward et al [3]).

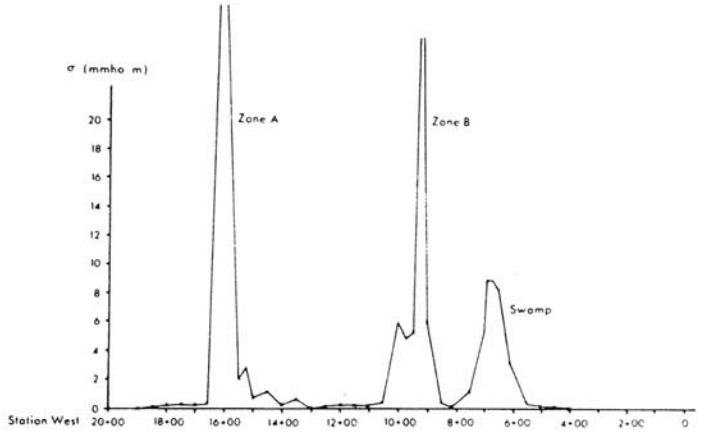


FIGURE 18. EM31 survey of Cavendish test range Line 'C'.

in Ontario which is often used by Canadian instrumentation manufacturers to test new electromagnetic geophysical equipment. The survey, along line C, illustrates response from both the swamp and the two zones of metallic mineralization. Although measurements were only taken every 50 ft. (15 meters) both zones are well delineated and when such high responses are encountered localization to within a few meters is quickly and easily carried out.

Inasmuch as the EM31 and EM34-3 were designed to map terrain conductivity at the conductivity levels encountered in typical soils both instruments are extremely sensitive electromagnetic detectors. For example on the most sensitive scale, full scale deflection for the EM31 is 800 ppm of the primary magnetic field and for the EM34-3 it is 3800 ppm. Such sensitivity makes either instrument useful for detecting metallic type conductors at what are very low conductivity levels by normal standards.

Case History #4

Location:	Mississauga, Ontario
Instruments:	EM31, EM34
Application:	Determination of bedrock topography

Total line length for this survey was 8400 ft. (2600 meters) and measurements were made every 100 ft. (30 meters) with both the EM31 and the EM34 – an earlier version of the EM34-3 which had two intercoil spacings vis. 100 ft. (30 meters) and 50 ft. (15 meters). The survey was performed to outline the cross-sectional profile of a

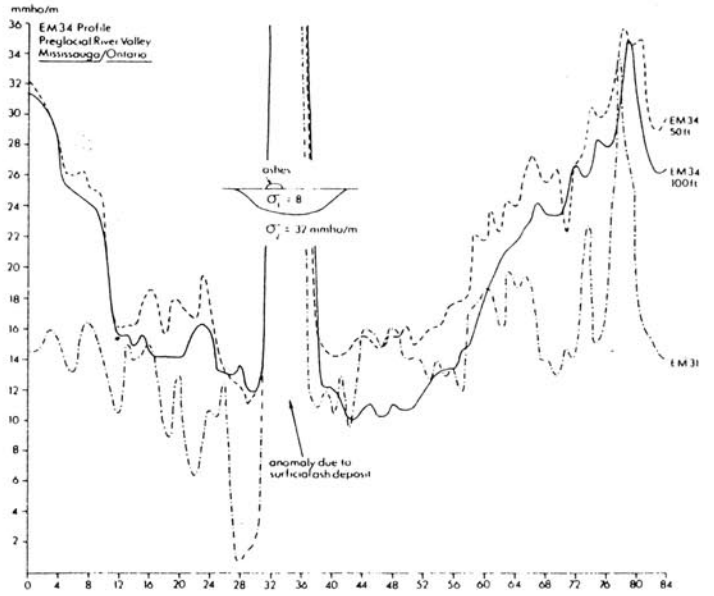


FIGURE 19. EM31 and EM34 survey line over preglacial river valley, Mississauga, Ontario.

buried preglacial river valley whose existence had been suggested from water-well data. At either intercoil spacing the time required for the EM34 profile was 1-1/2 hours, resulting in approximately one survey measurement per minute – including the time to walk the 100 feet between measurement stations. The time taken for the subsequent EM31 survey was similar.

Typical bedrock conductivity in the area is approximately 30 mmho/m, whereas an average value for the conductivity of the infilling glacial till is of the order of 8 to 12 mmho/m. Thus the EM34 at either intercoil spacing yields approximately 30 mmho/m at the valley edges where the overburden is thin and 12 to 14 mmho/m at the valley centre. The EM31 yields values of 14 to 18 mmho/m at the valley edges (slightly affected by the presence of bedrock) and approximately 10 mmho/m at the valley centre. The interpreted depth of the valley, based on the model shown in the figure, is approximately 120 feet (36 meters) which is in reasonable agreement with the water-well data value of 150 feet (45 meters), bearing in mind that the three sets of data show that a two-layer model is an over simplification.

The conductivity high which occurs between stations 32 and 38 results from a very large pile of waste furnace ash lying on the surface.

Case History #5

Location:	Camp Borden, Ontario
Instruments:	EM31, EM34
	Conventional resistivity apparatus
Application:	Mapping groundwater salinity
	Comparison of EM34 and conventional resistivity

Geophysical surveys were carried out over a sanitary landfill site using, in addition to other instruments, an EM31, EM34 and conventional resistivity [4]. The survey results in the accompanying figures illustrate the good agreement between these techniques and also indicate the reduction in survey time achieved using inductive electromagnetic techniques. Particularly interesting are the vertical variations in resistivity as shown by the EM31 at 3.7 m intercoil spacing and the EM34 at 15 and 30 m spacing.

VII. SUMMARY

This technical note describes in detail the principles of mapping the electrical conductivity of the ground using magnetically induced

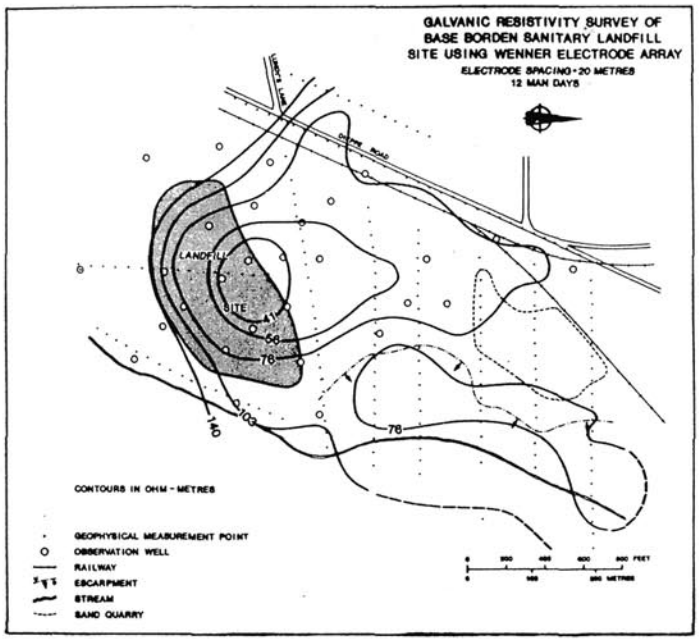


FIGURE 20(a).

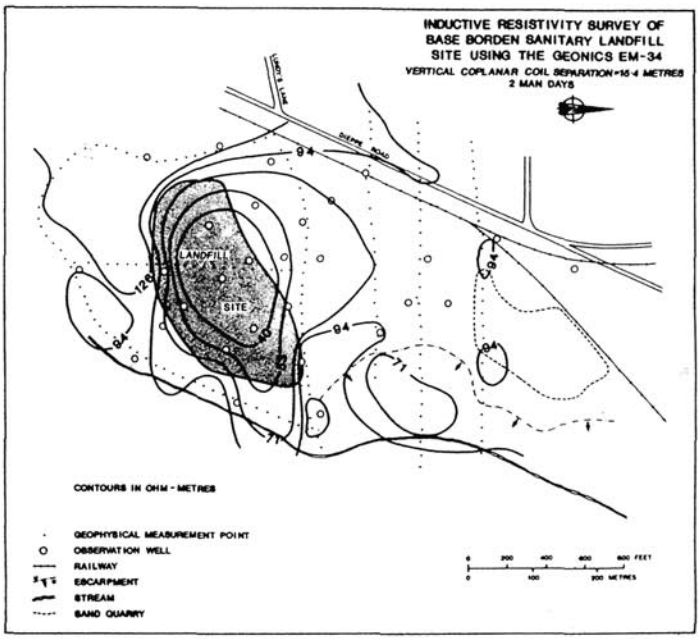


FIGURE 20(c).

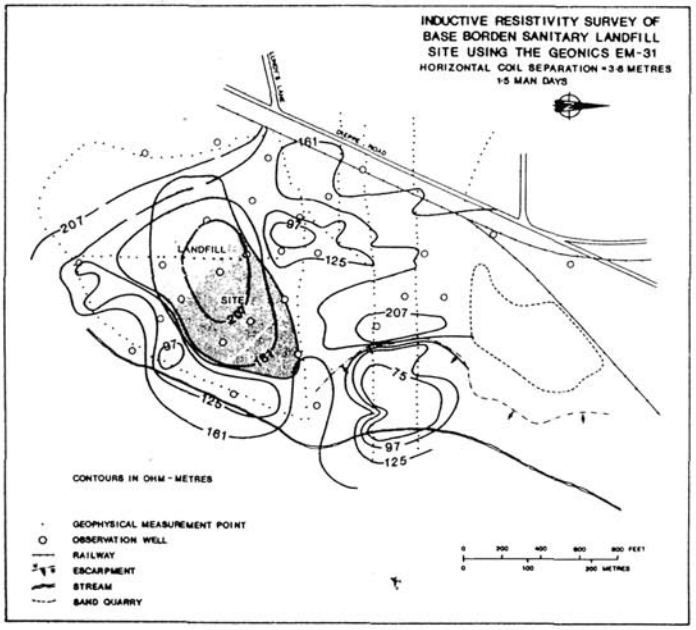


FIGURE 20(b).

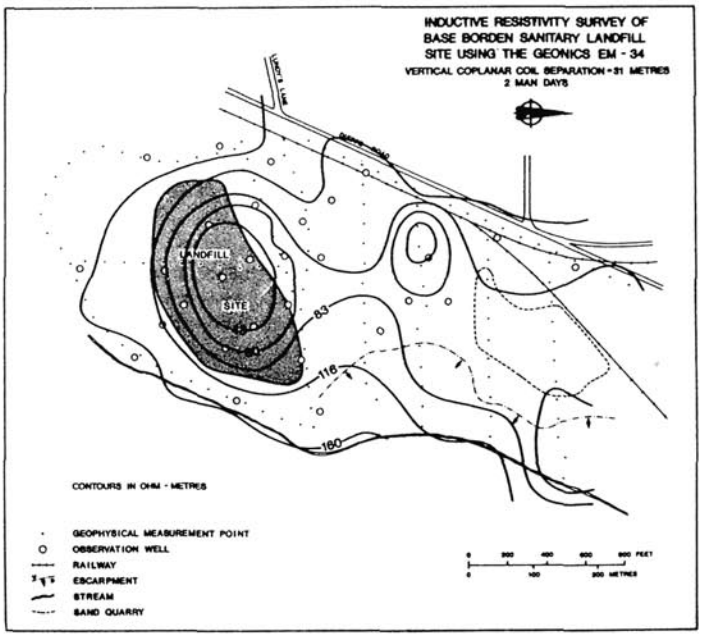


FIGURE 20(d).

currents at low frequencies. It has been shown that certain advantages can be derived from working at low values of induction number. Amongst these are excellent resolution in conductivity, a substantial reduction in man-hours necessary to carry out a conductivity survey and a simplification in the calculation of layered earth response.

Two points should be kept constantly in mind when performing surveys of this type to map geology. The first is that these instruments map only the electrical conductivity. If the conductivity does not vary significantly with the geological environment, or if parameters other than the geology also influence the conductivity, the survey results may be difficult to interpret.

The second point is that measurement of terrain conductivity, like any other geophysical measurement, must begin and end with geology. Such measurements are only an aid to help visualize geological conditions which cannot be seen. It is always necessary to interpret geophysical data against known geology from out-crops, boreholes, or any other such "bench marks". Geophysical measurements can be very effective by allowing interpolation between such sources, or extrapolation away from them. However in every case knowledge derived from geophysical measurements must be eventually reconfirmed against known geological conditions.

BIBLIOGRAPHY

(1) Keller, G.V., Frischknecht, F.C. Electrical Methods in Geophysical Prospecting. Pergamon Press 1966.

(2) Wait, J.R. 1962. A Note on the Electromagnetic Response of a Stratified Earth. Geophysics V.27, pp 382-85.

(3) Ward, S.H.; Pridmore, D.F.; Rijol, Glenn W.E. Multispectral Electromagnetic Exploration for Sulphides. Geophysics Vol. 39 No. 5 p. 666. 1974.

(4) Survey carried out by Dr. J. Greenhouse, University of Waterloo, Waterloo, Ontario.

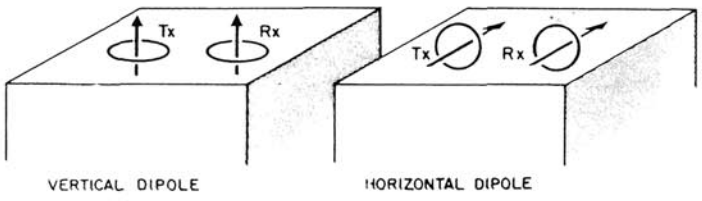


FIGURE AI. Vertical and horizontal dipole coil configurations.

APPENDIX: Theory of Operation at Low Induction Numbers

Consider the two coil configurations shown in Figure AI. In each case the transmitter coil is energized with alternating current at a frequency f Hertz. The measured quantity is the ratio of the secondary magnetic field H_s at the receiver when both coils are lying on the surface of the homogeneous half-space of conductivity σ to the primary magnetic field H_p in the absence of the half-space (i.e. as if the coils were in free space). The spacing between the coils is s meters.

The field ratios for vertical and horizontal dipole configurations are given by equations (1) and (2) respectively.

$$\left(\frac{H_s}{H_p}\right)_V = \frac{2}{(\gamma s)^2}\{9 - [9 + 9\gamma s + 4(\gamma s)^2 + (\gamma s)^3]\, e^{-\gamma s}\} \quad (1)$$

$$\left(\frac{H_s}{H_p}\right)_H = 2\left[1 - \frac{3}{(\gamma s)^2} + [3 + 3\gamma s + (\gamma s)^2]\frac{e^{-\gamma s}}{(\gamma s)^2}\right] \quad (2)$$

where $\gamma = \sqrt{i\omega\mu_o\sigma}$
$\omega = 2\pi f$
f = frequency (Hz)
μ_o = permeability of free space
$i = \sqrt{-1}$.

These expressions are complicated functions of the variable γs which is in turn a reasonably complicated (complex) function of frequency and conductivity. However, as will be shown below, under certain conditions they can be greatly simplified.

A well known characteristic of a homogeneous half-space is the electrical skin depth δ, which is defined as the distance in the half-space that a propagating plane wave has travelled when its amplitude has been attenuated to 1/e of the amplitude at the surface. The skin depth is given by

$$\delta = \sqrt{\frac{2}{\omega\mu_o\sigma}} = \frac{\sqrt{2i}}{\gamma} \quad (3)$$

and therefore

$$\gamma s = \sqrt{2i}\,\frac{s}{\delta} \quad (4)$$

The ratio s/δ, the intercoil spacing divided by the skin depth, is defined as the induction number B, whereupon

$$\gamma s = \sqrt{2i}\ B \quad (5)$$

Now if B is much less than unity (ie $\gamma s \ll 1$) it is a simple matter to show that the field ratios of equations (1) and (2) reduce to the simple expression

$$\left(\frac{H_s}{H_p}\right)_V \simeq \left(\frac{H_s}{H_p}\right)_H \simeq \frac{iB^2}{2} = \frac{i\omega\mu_o\sigma s^2}{4} \quad (6)$$

which is the equation given in Section II.

The magnitude of the secondary magnetic field is now directly proportional to the ground conductivity and the phase of the secondary magnetic field leads the primary magnetic field by 90°.

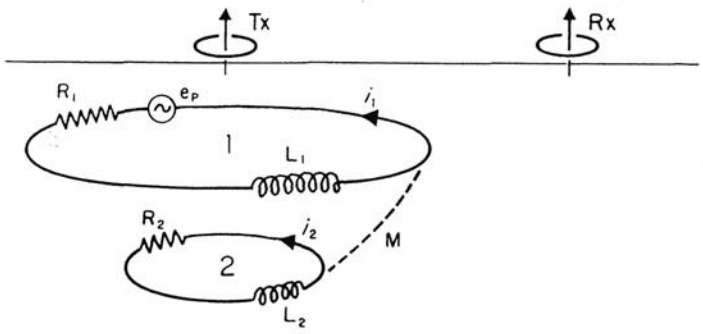


FIGURE AII. Electrical model for vertical dipoles.

To make B much less than unity we see that we must make s very much less than δ and thus

$$\omega \ll \frac{2}{\mu_o\sigma s^2} \quad (7)$$

That is, having decided on a value for s (which fixes the effective depth of penetration under the condition $B \ll 1$), the maximum probable ground conductivity is estimated and the operating frequency is chosen so that equation (7) is always satisfied.

The apparent conductivity which the instrument reads is then defined by

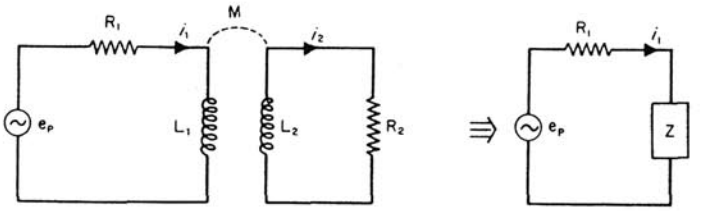
$$\sigma_a = \frac{4}{\omega\mu_o s^2}\left(\frac{H_s}{H_p}\right)_{\substack{\text{quadrature}\\ \text{component}}} \quad (8)$$

To examine the reasons for this simplification let us focus our attention on the vertical dipole coil configuration shown in Figure AII since symmetry makes this configuration the simplest to understand.

Consider current loop 1. The primary emf e_p causing this current to flow is given (through Faraday's law) by the time rate of change of the primary magnetic flux from the transmitter through this loop. Three impedances cause the current to be limited. These arise from (i) the electrical resistance R_1 of the loop, (ii) the fact that the current i_1 generates its own magnetic field which causes a time-varying secondary magnetic flux through the loop (self-inductance, L_1), and (iii) the fact that all other current loops such as i_2 generate their own magnetic fields which in turn cause a time-varying magnetic flux to link with loop 1 (mutual-inductance, M).

The equivalent circuit for this configuration is easily derived from elementary circuit theory with the result shown in Figure AIII.

The complex impedance Z incorporates all of the affects of magnetic coupling between current loop 1 and any other current loop 2. We see from this expression that Z can be made arbitrarily small by reducing $\omega = 2\pi f$, the operating frequency. When Z is thus



$$Z = i\omega L_1 + \frac{\omega^2 M^2}{R_2 + i\omega L_2}$$

$$i_1 = \frac{e_p}{R_1 + Z}$$

FIGURE AIII. Equivalent circuit for model of Figure AII.

made much smaller than R_1 the current flow in loop 1 is simply given by

$$i_1 = \frac{e_p}{R_1} = \frac{i\omega\phi_p}{R_1} = i\omega\phi_p G_1 \qquad (9)$$

where ϕ_p = primary flux linking loop 1
G_1 = conductance of loop 1 ($G_1 = 1/R_1$)
$i = \sqrt{-1}$

We see that the magnitude of the current is linearly proportional to the loop conductance and furthermore that the phase of the current leads the primary flux by 90°. Since the secondary magnetic field at the receiver from current i_1 is in phase with and directly proportional to i_1 it too will be directly proportional to G and will lead the primary flux by 90°. Thus

$$\left(\frac{H_s}{H_p}\right) \propto i\omega G_1 \qquad (10)$$

which has the same dependence on frequency and conductance as equation (6). We infer therefore, that the condition $B \ll 1$ is equivalent to stating that for all current loops that affect the receiver output the operating frequency is so low that we can ignore any magnetic coupling between the loops. Thus the current that flows in any loop is (i) completely independent of the current that flows in any other loop since they are not magnetically coupled and (ii) is only a function of the primary magnetic flux linking that loop and of the local ground conductivity.

The lack of interaction between current loops is of great importance in simplifying the data reduction procedures. Of equally great significance is the fact that for any value of B and for any orientation of a magnetic dipole (or indeed of any magnetic source) over either a uniform halfspace or a horizontally stratified earth it can be shown that all current flow is horizontal. That this is the case for a vertical dipole is easy to see from symmetry; for a horizontal dipole it is less evident but equally true. Thus, in a horizontally layered earth no current crosses an interface which is fortunate since, if it did, changing either of the conductivities would, by virtue of refraction of the current, change the direction of the current as it flowed from one medium to the other.

If no current flow crosses an interface and if there is no magnetic coupling between current loops, changing the conductivity of any one of the layers of a horizontally stratified earth will not alter the geometry of the current flow. Varying the conductivity of any layer will proportionately vary only the magnitude of the current in that layer. To calculate the resultant magnetic field at the surface of a horizontally layered earth it is simply necessary to calculate the independent contribution from each layer, which is a function of its depth and conductivity, and to sum all the contributions.

The functions $\phi(z)$ and R(z) discussed in Section II define the relative influence of current flow as a function of depth. Their derivation is involved and will not be given here. The resultant

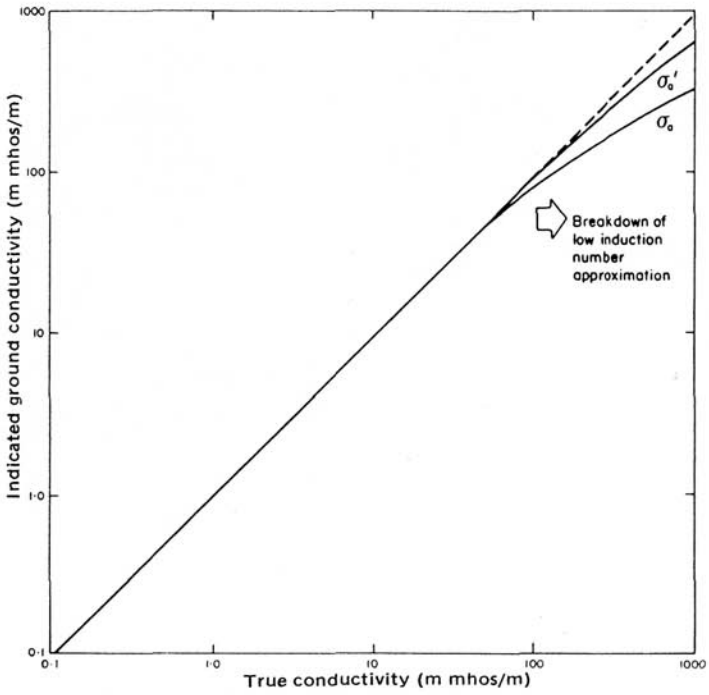


FIGURE AIV. Plot of indicated conductivity for EM31 versus true (homogeneous half-space) conductivity for both vertical (σ_a) and horizontal (σ_a') dipoles.

expressions are, however, simple and easily programmed into hand calculators:

$$\phi_V(z) = \frac{4z}{(4z^2 + 1)^{3/2}} \qquad (11)$$

$$\phi_H(z) = 2 - \frac{4z}{(4z^2 + 1)^{1/2}} \qquad (12)$$

$$R_V(z) = \frac{1}{(4z^2 + 1)^{1/2}} \qquad (13)$$

$$R_H(z) = (4z^2 + 1)^{1/2} - 2z \qquad (14)$$

where z is the depth divided by the intercoil spacing.

Finally it should be noted that for a given frequency and intercoil spacing as the terrain conductivity increases the approximation of equation (6) eventually breaks down and the instrumental output is no longer proportional to terrain conductivity. This effect is illustrated in Figure AIV. which plots apparent (indicated) conductivity against true (homogeneous halfspace) conductivity for both vertical and horizontal transmitter/receiver dipoles for the operating parameters of the EM31. As would be expected the horizontal dipoles exhibit linearity to greater values of conductivity as a result of the reduced depth of penetration in this configuration.

APPENDIX C
Geonics Technical Note 30

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Technical Note TN-30

WHY DOESN'T GEONICS LIMITED BUILD A MULTI-FREQUENCY EM31 OR EM38?

J.D. McNeill

November 1996

Technical Note TN-30

WHY DOESN'T GEONICS LIMITED BUILD A MULTI-FREQUENCY EM31 OR EM38?

Introduction

In this technical note we address the question of, "Why doesn't Geonics Limited build a Multi-frequency EM31 or EM38?"

There are, in principle, two reasons for building such instruments. These are (a) to allow the resolution of a multi-layered earth (geoelectrical sounding) rather than just measuring the bulk conductivity, and (b) supplying additional interpretive data for improving target diagnostics in identifying the nature of buried metal.

In this technical note we point out that (a) unless the operating frequency range of a multi-frequency EM31 or EM38 extends up to the MHz range it is impossible to resolve a multi-layered earth with such an instrument, and (b) the coil configuration of the EM31 or EM38, and the fact that they operate in the frequency domain, means that whilst useful for indicating the presence of buried metal, they are poor at accurately locating and identifying the nature of the buried metal.

(a) Multi-frequency ground conductivity meters. How useful?

Geonics Limited, the original designer of ground conductivity meters, has been building these devices for many years. Indeed, these instruments are now the principal tool for groundwater contamination mapping and are also widely used for detecting buried metal. The well-known EM31, with its 12 ft (3.67 m) intercoil spacing provides a maximum useful depth of exploration of about 18 ft (5.5 m).

The EM31 operates at a single frequency of 10 kHz. The question is often asked as to why Geonics does not make an EM31 with many frequencies so that the operator can detect and interpret multi-layered earth geometry.

Unfortunately, the physics which describes the operation of these devices gives good reasons for staying with a single frequency. The EM31, with a frequency of 10 kHz and intercoil spacing of 12 ft, has an intercoil spacing that is much less than a skin depth for all but the most conductive ground. This means that the response is directly proportional to the ground conductivity, and allows us to calibrate the units directly in mS/m. The penalty of operating at only 10 kHz (i.e. within the low induction number approximation) is that we cannot give information about layering within the earth.

Now it turns out that in order to give good information about layering we must operate a multi-frequency ground conductivity meter over a wide range of frequencies, the highest of which must be chosen so that the skin depth in the ground is significantly less than the intercoil spacing.

A typical earth conductivity is 25 mS/m. The skin depth (in meters) is given by

$$d = 500/\sqrt{s*f}$$

where s = ground conductivity (mS/m)
and f = frequency (kHz)

so that, if s = 25 mS/m (a typical value) and f = 1,000 kHz (i.e. 1 MHz), d = 3.16 m, and even at this high frequency the skin depth is only marginally less than the intercoil spacing. In order to give useful geoelectric information about a layered earth, a 12 ft ground conductivity meter must operate at frequencies up to at least 1 MHz. This situation becomes progressively worse as we shorten the intercoil spacing - i.e. we must go to even higher frequencies to resolve layered earths.

What happens if the frequency range does not extend to sufficiently high frequencies? In this case equivalence becomes a major problem. Equivalence is defined as the fact that many different layered earth models will give the same measured response with frequency. Thus the interpreter might, at most, be able to tell that, "Yes, the earth appears to be layered", but he will not be able to give any further useful information as to the nature of the layering. We have recently seen an example where a manufacturer of a multi-frequency EM instrument shows how the response would vary with different layering. What is ignored is that, except in extraordinarily conductive earth, it is not possible to uniquely define the layering. Anyone contemplating the use of a multi-frequency EM should investigate the problem of equivalence very thoroughly.

It has been stated by Won et al (1996) that their GEM-2, with intercoil spacing of 1.67 m and highest operating frequency of 22 kHz (or the more recent GEM-300), can be used for geoelectric sounding. For the reasons outlined above detailed examination of the theory will show that this is simply not possible.

Similar arguments can be brought to bear against their claim that the multi-frequency approach will serve to give the depth to metallic targets. Once again, the theory shows that this is simply not possible.

There is a further problem in the design of a multi-frequency instrument. It is not a simple matter to accurately set and maintain the instrumental zero for a "simple" single frequency instrument such as the EM31. The problem becomes much more severe for a multi-frequency instrument. For example, the manufacturers of the MaxMin multi-frequency EM system suggest that the zeroes should be set over "neutral" ground, i.e. ground that is of very low conductivity. But who is to tell that the ground is indeed "neutral" until the zeroes have been accurately set. This "chicken and egg" problem

becomes more difficult as the zeroes have to be set (and accurately maintained) for an increasing number of frequencies. Particularly at the lower frequencies, drift becomes a virtually insolvable problem, rendering such instruments as the GEM-2 or the GEM-300 inappropriate for anything other than metal detection.

It should be noted that the original design concept for the EM31 was indeed to make a multi-frequency instrument that would accurately measure earth layering. Detailed examination of the theoretical and practical problems showed then that this was not possible (and still is not) and that a much more useful device would result if it operated at only a single frequency, chosen to be low enough so that the instrument read directly in units of ground conductivity, and high enough so that the instrument enjoyed a zero level that was sufficiently stable that the survey data could be accurately contoured at contour intervals of less than 1 mS/m. None of these factors have changed! While the concept of a multi-frequency instrument appears to be very attractive, the practical problems in manufacturing and maintaining an instrument that provides accurate data up to at least 1 MHz are formidable, and an instrument with smaller frequency range will simply not do the job.

We categorically state that the multi-frequency capability of the GEM-2 or GEM-300 provides no useful benefit in either geoelectric sounding or metallic target depth determination and, furthermore, that this instrument will not provide better data than the EM38 when used for conventional conductivity mapping.

(b) Multi-frequency EM devices for metal detection. How useful?

In the first part of this technical note we explained why a multi-frequency EM31 (or equivalent instrument) was completely inadequate for geoelectrical sounding unless the frequency range of the instrument extend to at least 1 MHz. But another useful application for such instruments appears to be the detection of buried metal. Surely a multi-frequency capability would assist in this application.

Unfortunately the answer is, "No, not significantly," and there are several reasons for this. It is not widely realized that, when a ferrous (for example, steel) plate is electromagnetically energized with the primary magnetic field parallel to the plane of the plate a large magnetic dipole moment is induced in the plate. More surprisingly, this magnetic dipole has both inphase and quadrature components, the ratio of which is a function of frequency, since it takes the induced magnetic dipoles a finite length of time to respond to the primary magnetic field. We will call this response the "permeability" response (noting that it is not a simple function of the plate electrical conductivity) to distinguish it from the normal "eddy current" response, which exhibits well-known behaviour as a function of plate conductivity. The frequency dependence of the inphase/quadrature phase ratio of the secondary magnetic field from the permeability response is, in general, quite different from that for eddy current flow. Furthermore the permeability response is, of course, induced by that component of the primary magnetic field which is parallel to the plane of the plate, whereas the eddy current response is induced by the component of the primary magnetic field that

is perpendicular to the plate. Thus, in the general case as we traverse with an EM31 or EM38 over a ferrous plate-like target, (and all targets, other

than spheres or long pipes, exhibit this dual response) the fact that the response is being caused by two sets of induced magnetic dipoles, at right angles to each other, and with different I/Q ratios, makes interpretation of the target response extremely difficult. For this reason, although the EM31 and EM38 are widely used for metal detection, Geonics Limited did not pursue the metal detection application for these instruments since we knew that target interpretation (including even simple accurate location) would be very difficult.

There is, furthermore, a second difficulty with use of an EM31 or EM38 for metal detection. Both of these instruments have a finite intercoil spacing, but to achieve the ultimate in spatial resolution we really want to have an intercoil spacing of "zero" meters, which is not possible with a frequency domain instrument.

Is there a solution to these problems? The answer is, "Yes," and the solution is to operate in the time domain, which offers two important advantages over the frequency domain for the metal detection application. The first is that operation in the time domain indeed allows us to reduce the intercoil spacing to zero, as is done with the Geonics EM61 time domain metal detector, in which the transmitter and receiver coils are coincident. Thus the TDEM EM61 will resolve the lateral location of targets of moderate depth to within about 10 cm. This obviously makes a tremendous difference in the amount of earth that has to be removed in order to retrieve such targets. Furthermore, an important market for metal detecting instruments lies in the detection of unexploded ordnance (UXO). This application requires the ultimate in spatial resolution since the chance is always present that there are two targets rather than one, and nobody wants to inadvertently detonate the second (unresolved and thus undetected target) while attempting to retrieve the first.

But what about the complexity caused by the fact that two orthogonal dipole moments, each with different frequency dependence of the I/Q ratio, are induced in all but the simplest targets. Here again, operation in the time domain presents a very useful advantage, since in the time domain the difference in I/Q ratios simply means that the two responses exhibit different time decay characteristics, which are easily resolved with a TDEM. This is clearly shown by survey profiles of the response from a horizontal ferrous metallic plate to our fully time domain version of the EM61 (the EM61-3D has many time gates). As the EM61 approaches the target, but is still some distance from it, the primary magnetic field is essentially parallel to the plate, and the time decay of the response is that of the induced permeability. As the EM61 moves to a central position over the plate, the response shifts entirely to eddy current flow, which has a completely different and immediately recognizable decay characteristic. Thus separation of the dual response is relatively simple, much more so than for operation in the frequency domain.

A recent paper (McNeill and Bosnar, 1996) is available for those who wish to learn more about the time-domain response of various metallic and UXO-type targets.

Finally, as if the advantages of operation in the time domain described above were not enough (i.e. better target location, and better interpretation of target type) yet another advantage occurs. The compact nature of the coil configuration of the EM61 allows us to easily add a second receiver coil, which, using a technique for which a patent has been applied, allows us to measure the depths of the target to within the order of 20 cm, again greatly facilitating target retrieval.

For these reasons we state categorically that use of the fully TDEM EM61-3D will yield far better data quality and interpretability than use of the GEM-2 or the GEM-300.

Geonics Limited did not pursue a multi-frequency metal detection version of the EM31 or EM38 for excellent reasons. They realized many years ago, as a result of their understanding of the basic physics of the target response, that the advantages of operation in the time domain for metal detection were overwhelming, and subsequently developed their very successful and now widely used EM61.

References

Won, I.J., Keiswetter, D.A., Fields, G.R.A., and Sutton, L.C. (1996). GEM-2: A New Multi-frequency Electromagnetic Sensor, J. Environmental and Engineering Geophysics. Vol 1, No. 2, pp 129-137.

McNeill, J.D., Bosnar, M. (1996). Application of Time Domain Electromagnetic Techniques to UXO Detection. Paper presented at the Williamsburg UXO Conference, March 1996.

Geophysical Survey
Raw Data

Easting	Northing	Q/P[mS/m	I/P[ppt]	Quality,	Sat.,	HDOP,	Time
394173.1	4781073	18	-0.42	2	7	1.5	39:16.0
394173.1	4781074	18.1	-0.37	2	7	1.5	39:17.0
394172.9	4781074	18.2	-0.37	2	7	1.5	39:18.0
394172.8	4781074	18.3	-0.4	2	7	1.5	39:19.0
394172.6	4781075	18.5	-0.32	2	7	1.5	39:20.0
394172.6	4781075	18.4	-0.38	2	8	1.1	39:21.0
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394166.6	4781115	19.6	-0.22	2	10	0.9	41:42.9
394166.2	4781115	19.7	-0.26	2	10	0.9	41:43.9
394165.8	4781114	19.6	-0.27	2	10	0.9	41:44.9
394165.6	4781114	19.9	-0.26	2	10	0.9	41:45.9
394165.2	4781113	20.03	-0.26	2	10	0.9	41:46.9
394165	4781113	20.1	-0.34	2	10	0.9	41:47.8
394169.4	4781119	20.2	-0.31	2	8	1.2	42:27.9
394169.7	4781119	20.2	-0.22	2	9	0.9	42:28.9
394169.9	4781118	19.9	-0.27	2	9	0.9	42:29.9
394170.2	4781117	19.4	-0.34	2	9	0.9	42:30.9
394170.6	4781117	19.1	-0.28	2	9	0.9	42:31.9
394170.9	4781116	19.1	-0.18	2	9	0.9	42:32.9
394171	4781115	19.2	-0.15	2	9	0.9	42:33.8
394170.9	4781114	19.2	-0.22	2	9	0.9	42:34.8
394170.8	4781114	18.7	-0.35	2	9	0.9	42:35.8
394170.6	4781113	18.8	-0.33	2	9	0.9	42:36.8
394170.4	4781113	19.6	-0.38	2	9	0.9	42:37.8
394170.4	4781112	20.4	-0.23	2	9	0.9	42:38.8
394170.4	4781112	21.2	-0.2	2	9	0.9	42:39.7
394170.2	4781111	21.63	-0.08	2	9	0.9	42:40.7
394170.6	4781110	21.2	-0.16	2	9	0.9	42:41.7
394170.9	4781110	20.9	-0.22	2	9	0.9	42:42.7
394171.2	4781109	20.7	-0.27	2	9	0.9	42:43.7
394171.4	4781109	20.43	-0.2	2	9	0.9	42:44.7
394171.5	4781108	19.8	-0.29	2	9	0.9	42:45.7
394171.5	4781107	19.45	-0.32	2	9	0.9	42:46.6
394171.4	4781106	19.2	-0.25	2	9	0.9	42:47.6
394171.5	4781106	19.25	-0.28	2	9	0.9	42:48.6
394171.4	4781105	19.5	-0.25	2	9	0.9	42:49.6
394171.2	4781104	19.6	-0.52	2	9	0.9	42:50.6
394171.3	4781104	19.6	-0.71	2	9	0.9	42:51.6
394171.4	4781103	19.5	-0.57	2	9	0.9	42:52.5
394171.3	4781102	19.8	-0.38	2	9	0.9	42:53.5
394171.3	4781102	20.3	-0.24	2	9	0.9	42:54.5

394171.1	4781101	20.78	-0.17	2	9	0.9	42:55.5
394171.1	4781100	20.7	-0.27	2	9	0.9	42:56.5
394171.2	4781100	20.8	-0.31	2	9	0.9	42:57.5
394171.2	4781099	21	-0.28	2	9	0.9	42:58.5
394171.2	4781098	20.9	-0.18	2	9	0.9	42:59.4
394171	4781098	20.9	-0.22	2	9	0.9	43:00.4
394170.8	4781097	20.8	-0.22	2	9	0.9	43:01.4
394170.8	4781097	20.7	-0.23	2	9	0.9	43:02.4
394170.8	4781096	20.7	-0.17	2	9	0.9	43:03.4
394170.8	4781096	20.3	-0.24	2	9	0.9	43:04.4
394170.5	4781095	19.9	-0.3	2	9	0.9	43:05.4
394170.2	4781094	19.6	-0.29	2	9	0.9	43:06.3
394170	4781094	19.2	-0.39	2	9	0.9	43:07.3
394170	4781093	19.3	-0.22	2	9	0.9	43:08.3
394170	4781092	19.5	-0.21	2	9	0.9	43:09.3
394170	4781092	19.88	-0.24	2	9	0.9	43:10.3
394170.1	4781091	20.2	-0.3	2	9	0.9	43:11.3
394170.2	4781090	20.1	-0.49	2	9	0.9	43:12.2
394170.4	4781090	20	-0.17	2	10	0.9	43:13.2
394170.6	4781089	19.5	-0.26	2	10	0.9	43:14.2
394170.8	4781088	19.3	-0.38	2	10	0.9	43:15.2
394170.8	4781088	19.5	-0.36	2	10	0.9	43:16.2
394170.7	4781087	19.6	-0.37	2	10	0.9	43:19.1
394170.9	4781087	19.6	-0.37	2	10	0.9	43:20.1
394171.1	4781086	19.7	-0.32	2	10	0.9	43:21.1
394171	4781086	19.4	-0.34	2	10	0.9	43:22.1
394170.9	4781085	18.9	-0.43	2	10	0.9	43:23.1
394170.9	4781085	18.78	-0.52	2	10	0.9	43:24.1
394170.9	4781084	18.4	-0.67	2	10	0.9	43:26.0
394170.9	4781084	18.9	-0.03	2	10	0.9	43:29.0
394170.9	4781083	18.7	-0.7	2	10	0.9	43:30.0
394170.9	4781083	19.63	-0.33	2	10	0.9	43:36.8
394171	4781083	19.5	-0.35	2	10	0.9	43:37.8
394171.2	4781082	19.08	-0.6	2	10	0.9	43:38.8
394171.6	4781082	19.1	-0.48	2	10	0.9	43:39.8
394172.1	4781082	18.9	-0.35	2	10	0.9	43:40.8
394172.3	4781082	18.25	-0.41	2	10	0.9	43:41.8
394172.5	4781081	17.9	-0.43	2	10	0.9	43:42.8
394172.7	4781081	17.8	-0.29	2	10	0.9	43:43.7
394172.7	4781080	17.65	-0.23	2	10	0.9	43:44.7
394173	4781080	17.2	-0.4	2	10	0.9	43:45.7
394173	4781079	17.2	-0.49	2	10	0.9	43:46.7
394173.4	4781079	17.4	-0.46	2	10	0.9	43:47.7
394173.2	4781078	17.6	-0.42	2	10	0.9	43:48.7
394173.3	4781078	17.6	-0.44	2	10	0.9	43:49.6
394173	4781077	17.4	-0.45	2	10	0.9	43:50.6
394172.8	4781077	17.6	-0.51	2	10	0.9	43:51.6

394173.2	4781076	17.75	-0.44	2	10	0.9	43:52.6
394173	4781076	17.9	-0.28	2	10	0.9	43:53.6
394173.1	4781075	18.1	-0.26	2	10	0.9	43:54.6
394173.2	4781075	18.1	-0.21	2	10	0.9	43:55.6
394172.7	4781075	17.9	-0.28	2	10	0.9	43:56.5
394172.7	4781074	17.8	-0.32	2	10	0.9	43:57.5
394172.4	4781074	17.7	-0.37	2	10	0.9	43:58.5
394171	4781073	17.3	-0.53	2	9	1	44:29.6
394170.7	4781073	17.8	-0.47	2	9	1	44:30.6
394170.4	4781074	17.8	-0.39	2	9	1	44:31.6
394170	4781074	18	-0.38	2	9	1	44:32.6
394170	4781075	17.9	-0.39	2	9	1	44:33.5
394169.7	4781075	18	-0.42	2	9	1	44:34.5
394169.4	4781076	18.1	-0.41	2	9	1	44:35.5
394169.2	4781076	18	-0.43	2	9	1	44:36.5
394169	4781077	18.6	-0.21	2	9	1	44:38.5
394168.5	4781077	18.1	-0.52	2	9	1	44:39.5
394168.2	4781077	17.6	-0.85	2	9	1	44:40.4
394167.8	4781078	18	-0.59	2	9	1	44:41.4
394167.5	4781078	18.3	-0.26	2	9	1	44:42.4
394167.1	4781078	18.03	-0.38	2	9	1	44:43.4
394166.8	4781079	18.1	-0.65	2	9	1	44:44.4
394166.5	4781079	18.4	-0.49	2	9	1	44:45.4
394166.2	4781080	19	-0.36	2	9	1	44:49.3
394166.1	4781080	19	-0.25	2	9	1	44:50.3
394166	4781081	19.1	-0.27	2	9	1	44:51.3
394166	4781081	18.8	-0.25	2	9	1	44:53.2
394166.1	4781082	18.6	-0.35	2	9	1	44:54.2
394165.9	4781082	18.5	-0.36	2	9	1	44:55.2
394165.7	4781083	18.8	-0.29	2	9	1	44:56.2
394165.8	4781084	18.9	-0.32	2	9	1	44:57.2
394165.7	4781084	19	-0.28	2	9	1	44:58.1
394165.6	4781084	19.1	-0.3	2	9	1	44:59.1
394165.6	4781085	19.3	-0.25	2	9	1	45:00.1
394165.7	4781085	19.3	-0.26	2	9	1	45:01.1
394165.9	4781086	18.93	-0.42	2	9	1	45:02.1
394165.9	4781086	18.85	-0.51	2	9	1	45:03.1
394166.1	4781087	19.4	-0.32	2	9	1	45:04.0
394166.3	4781087	19.35	-0.23	2	9	1	45:05.0
394166.6	4781088	19.1	-0.19	2	9	1	45:06.0
394166.8	4781088	18.9	-0.17	2	9	1	45:07.0
394167	4781088	18.7	-0.17	2	9	1	45:08.0
394166.9	4781089	18.9	-0.38	2	9	1	45:09.0
394167	4781089	19.1	-0.4	2	9	1	45:10.0
394167.2	4781090	19.1	-0.41	2	9	1	45:10.9
394167.3	4781090	19.3	-0.33	2	9	1	45:11.9
394167.3	4781091	19.3	-0.37	2	9	1	45:12.9

394167.5	4781092	19.2	-0.22	2	9	1	45:13.9
394167.3	4781092	19	-0.3	2	9	1	45:14.9
394167.3	4781093	19.2	-0.42	2	9	1	45:15.9
394167.4	4781094	19.6	-0.27	2	9	1	45:16.8
394167.2	4781094	20	-0.28	2	9	1	45:17.8
394167.1	4781095	20.3	-0.35	2	9	1	45:18.8
394167	4781096	20.6	-0.26	2	9	1	45:19.8
394166.7	4781096	20.9	-0.27	2	9	1	45:20.8
394166.5	4781097	20.8	-0.26	2	9	1	45:21.8
394166.6	4781098	20.5	-0.32	2	9	1	45:22.7
394166.4	4781098	20.6	-0.32	2	9	1	45:23.7
394166.7	4781099	20.9	-0.27	2	9	1	45:24.7
394166.6	4781099	20.9	-0.25	2	9	1	45:25.7
394166.9	4781100	20.8	-0.22	2	9	1	45:26.7
394167.1	4781100	20.7	-0.22	2	9	1	45:27.7
394167.1	4781101	20.6	-0.25	2	9	1	45:28.7
394167.3	4781101	20.8	-0.13	2	9	1	45:29.6
394167.2	4781102	20.6	-0.17	2	9	1	45:30.6
394167.4	4781102	20.6	-0.18	2	9	1	45:31.6
394167.4	4781103	20.65	-0.14	2	9	1	45:32.6
394167.4	4781103	20.5	-0.19	2	9	1	45:33.6
394167.5	4781104	20.1	-0.27	2	9	1	45:34.6
394167.4	4781105	19.7	-0.4	2	9	1	45:35.5
394167.4	4781105	19.7	-0.34	2	9	1	45:36.5
394167.2	4781105	19.9	-0.29	2	9	1	45:37.5
394167.1	4781106	19.8	-0.3	2	9	1	45:38.5
394166.8	4781106	19.7	-0.34	2	9	1	45:39.5
394166.6	4781107	19.8	-0.26	2	9	1	45:40.5
394166.1	4781107	20	-0.23	2	9	1	45:41.5
394165.7	4781107	20.33	-0.38	2	9	1	45:42.4
394165.7	4781108	21.1	-0.1	2	9	1	45:43.4
394165.5	4781108	21.8	0.15	2	9	1	45:44.4
394165.7	4781109	21.8	0.1	2	9	1	45:45.4
394165.9	4781109	21.9	-0.09	2	9	1	45:46.4
394165.6	4781109	22.1	-0.09	2	9	1	45:47.4
394165.7	4781110	21.83	-0.2	2	9	1	45:48.3
394165.7	4781110	21.78	-0.12	2	9	1	45:49.3
394165.6	4781110	21.8	-0.19	2	9	1	45:50.3
394165.6	4781111	21.9	0.14	2	9	1	45:51.3
394166	4781111	21.3	0.02	2	9	1	45:52.3
394166.5	4781112	20.5	-0.25	2	9	1	45:53.3
394166.7	4781112	20.03	-0.26	2	9	1	45:54.3
394166.9	4781112	19.6	-0.27	2	10	0.9	45:55.2
394167.1	4781113	19.3	-0.32	2	10	0.9	45:56.2
394167.3	4781113	19.1	-0.38	2	10	0.9	45:57.2
394167.5	4781114	19.4	-0.32	2	10	0.9	45:58.2
394167.6	4781115	19.53	-0.27	2	10	0.9	45:59.2

394167.5	4781115	19.4	-0.29	2	10	0.9	46:00.2
394167.6	4781116	19.3	-0.64	2	10	0.9	46:01.1
394167.5	4781116	19.5	-0.43	2	10	0.9	46:02.1
394167.3	4781117	19	-0.66	2	10	0.9	46:03.1
394167.3	4781117	19	-0.49	2	10	0.9	46:04.1
394167.1	4781118	19.63	-0.2	2	9	1	46:05.1
394167.1	4781118	19.8	-0.15	2	9	1	46:06.1
394167	4781119	19.2	-0.4	2	9	1	46:07.0
394166.9	4781119	19.75	-0.25	2	9	1	46:08.0
394167	4781120	20.3	-0.22	2	9	1	46:09.0
394166.9	4781120	20.4	-0.2	2	9	1	46:10.0
394166.9	4781121	20.3	-0.29	2	9	1	46:11.0
394167	4781121	20.3	-0.37	2	9	1	46:12.0
394166.9	4781122	20.8	-0.36	2	8	1	46:13.0
394166.6	4781123	21.7	-0.26	2	8	1	46:13.9
394166.7	4781124	22.3	-0.34	2	9	1	46:14.9
394166.7	4781124	22.4	-0.36	2	8	1	46:15.9
394165.4	4781125	22.4	-0.22	2	10	0.9	46:47.2
394165.4	4781124	21.95	-0.25	2	10	0.9	46:48.2
394165.5	4781124	21.4	-0.34	2	10	0.9	46:49.2
394165.5	4781123	20.8	-0.28	2	10	0.9	46:50.2
394165.5	4781123	20.6	-0.15	2	10	0.9	46:51.2
394165.6	4781122	20.9	-0.1	2	10	0.9	46:52.1
394165.5	4781122	21.3	-0.24	2	10	0.9	46:53.1
394165.5	4781122	21.4	-0.54	2	10	0.9	46:54.1
394165.7	4781121	20.4	-1.09	2	10	0.9	46:57.1
394165.7	4781121	20.9	-0.41	2	10	0.9	46:58.1
394165.8	4781120	20.8	-0.34	2	10	0.9	46:59.0
394165.9	4781119	20.4	-0.38	2	10	0.9	47:00.0
394165.8	4781119	20.2	-0.44	2	10	0.9	47:01.0
394165.5	4781118	20.1	-0.4	2	10	0.9	47:02.0
394165.3	4781118	19.95	-0.35	2	10	0.9	47:03.0
394165	4781117	20.1	-0.38	2	10	0.9	47:04.0
394164.8	4781116	20.1	-0.47	2	10	0.9	47:05.0
394164.8	4781116	20.38	-0.4	2	10	0.9	47:05.9
394164.9	4781115	20.3	-0.16	2	10	0.9	47:06.9
394164.7	4781114	19.9	-0.42	2	10	0.9	47:07.9
394164.5	4781114	19.9	-0.28	2	10	0.9	47:08.9
394164.3	4781113	20.6	-0.22	2	10	0.9	47:10.9
394164.4	4781113	20.9	-0.15	2	10	0.9	47:11.8
394164.4	4781112	20.93	-0.25	2	10	0.9	47:12.8
394164.3	4781112	21.2	-0.23	2	10	0.9	47:13.8
394164.3	4781111	22	0.08	2	10	0.9	47:14.8
394164.3	4781111	22.5	0.23	2	10	0.9	47:15.8
394164.2	4781110	22.1	0.06	2	10	0.9	47:17.8
394164.4	4781110	22.3	0	2	10	0.9	47:20.7
394164.6	4781110	22.2	-0.02	2	10	0.9	47:21.7

394164.8	4781109	21.35	-0.06	2	10	0.9	47:22.7
394164.8	4781109	20.6	-0.19	2	10	0.9	47:23.7
394164.8	4781108	20.15	-0.29	2	10	0.9	47:24.6
394165	4781107	20	-0.38	2	10	0.9	47:25.6
394164.8	4781107	20.2	-0.22	2	10	0.9	47:26.6
394164.9	4781106	20.2	-0.26	2	10	0.9	47:27.6
394165	4781105	20.3	-0.27	2	10	0.9	47:28.6
394164.9	4781105	20.58	-0.35	2	10	0.9	47:29.6
394165.1	4781104	20.93	-0.32	2	10	0.9	47:30.6
394165.3	4781103	20.93	-0.31	2	10	0.9	47:31.5
394165.2	4781103	20.3	-0.38	2	10	0.9	47:32.5
394165	4781102	20.45	-0.41	2	10	0.9	47:33.5
394165.1	4781102	20.5	-0.43	2	10	0.9	47:34.5
394165.2	4781101	20.4	-0.34	2	10	0.9	47:35.5
394165.4	4781100	20.43	-0.2	2	10	0.9	47:36.5
394165.8	4781099	20.5	-0.19	2	10	0.9	47:37.5
394165.8	4781099	20.5	-0.17	2	10	0.9	47:38.4
394165.8	4781098	20.6	-0.16	2	10	0.9	47:39.4
394165.9	4781097	20.6	-0.27	2	10	0.9	47:40.4
394165.8	4781097	20.3	-0.3	2	10	0.9	47:41.4
394165.9	4781096	20.1	-0.25	2	10	0.9	47:42.4
394165.8	4781095	20	-0.26	2	10	0.9	47:43.4
394165.9	4781095	19.93	-0.22	2	10	0.9	47:44.4
394165.8	4781094	19.8	-0.29	2	10	0.9	47:45.3
394165.8	4781094	19.2	-0.38	2	10	0.9	47:46.3
394165.7	4781093	19.1	-0.39	2	10	0.9	47:47.3
394165.5	4781093	19.2	-0.32	2	10	0.9	47:48.3
394165.4	4781092	19.4	-0.33	2	10	0.9	47:49.3
394165.2	4781092	19.5	-0.22	2	10	0.9	47:50.2
394165.2	4781091	19.5	-0.27	2	10	0.9	47:51.2
394165.1	4781090	19.53	-0.26	2	10	0.9	47:52.2
394165.2	4781090	19.6	-0.28	2	10	0.9	47:53.2
394165.4	4781089	19.6	-0.32	2	10	0.9	47:54.2
394165.3	4781089	19.7	-0.3	2	10	0.9	47:55.2
394165.4	4781089	19.5	-0.34	2	10	0.9	47:56.2
394165.4	4781088	19.7	-0.31	2	10	0.9	47:57.1
394165.7	4781088	19.7	-0.33	2	10	0.9	47:58.1
394165.6	4781087	19.65	-0.31	2	10	0.9	47:59.1
394165.9	4781087	19.5	-0.38	2	10	0.9	48:00.1
394165.9	4781086	19.5	-0.25	2	10	0.9	48:01.1
394166.1	4781086	19.1	-0.43	2	10	0.9	48:04.0
394166.1	4781085	19.15	-0.34	2	10	0.9	48:05.0
394166.2	4781085	19.2	-0.31	2	10	0.9	48:06.0
394166.1	4781084	18.95	-0.45	2	10	0.9	48:07.0
394166.2	4781084	18.83	-0.48	2	10	0.9	48:08.0
394166.1	4781084	19	-0.4	2	10	0.9	48:08.9
394166.3	4781084	19	-0.4	2	10	0.9	48:09.9

394163.8	4781083	18.5	-0.58	2	10	0.9	48:50.7
394163.6	4781084	18.1	-0.77	2	10	0.9	48:51.7
394163.2	4781084	18.7	-0.35	2	10	0.9	48:53.7
394162.7	4781084	18.7	-0.38	2	10	0.9	48:54.7
394162.2	4781084	18.83	-0.41	2	10	0.9	48:55.6
394161.9	4781085	19.2	-0.39	2	10	0.9	48:56.6
394161.6	4781085	19.23	-0.44	2	9	1	48:57.6
394161.5	4781085	19.1	-0.4	2	9	1	48:58.6
394161.4	4781086	18.9	-0.37	2	9	1	48:59.6
394161.3	4781087	19.15	-0.22	2	9	1	49:00.6
394161.3	4781087	19.4	-0.31	2	9	1	49:01.5
394161.2	4781088	19.5	-0.33	2	9	1	49:02.5
394161.3	4781088	19.3	-0.24	2	9	1	49:03.5
394161.5	4781089	19.2	-0.31	2	9	1	49:04.5
394161.5	4781089	19.25	-0.36	2	9	1	49:05.5
394161.8	4781089	19.1	-0.37	2	9	1	49:06.5
394162.1	4781089	19.2	-0.28	2	9	1	49:07.4
394162.5	4781089	18.88	-0.37	2	9	1	49:08.4
394162.8	4781089	18.7	-0.44	2	9	1	49:09.4
394163	4781089	18.6	-0.55	2	9	1	49:10.4
394163	4781089	19.1	-0.31	2	9	1	49:11.4
394163.3	4781089	19	-0.49	2	9	1	49:12.4
394163.2	4781090	19.2	-0.35	2	9	1	49:13.3
394163.2	4781090	18.93	-0.32	2	9	1	49:14.3
394162.8	4781091	18.3	-0.58	2	9	1	49:15.3
394162.8	4781091	18.5	-0.5	2	9	1	49:16.3
394162.4	4781092	19.2	-0.4	2	9	1	49:17.3
394161.8	4781092	20	-0.32	2	9	1	49:18.3
394161.7	4781093	20.4	-0.25	2	9	1	49:19.2
394161.6	4781093	20.1	-0.32	2	9	1	49:20.2
394161.7	4781094	20	-0.31	2	9	1	49:21.2
394161.8	4781094	20.2	-0.3	2	9	1	49:22.2
394161.8	4781095	20.4	-0.3	2	9	1	49:23.2
394162	4781096	20.13	-0.33	2	9	1	49:24.2
394162	4781096	19.9	-0.39	2	9	1	49:25.2
394162	4781097	20	-0.38	2	9	1	49:26.1
394162.2	4781097	20	-0.33	2	9	1	49:27.1
394162.3	4781098	19.95	-0.39	2	9	1	49:28.1
394162.3	4781099	19.73	-0.43	2	9	1	49:29.1
394162.1	4781099	19.8	-0.36	2	9	1	49:30.1
394162	4781099	20.05	-0.3	2	9	1	49:31.1
394161.8	4781100	20	-0.24	2	10	0.8	49:32.0
394161.6	4781100	19.5	-0.25	2	10	0.8	49:33.0
394161.6	4781100	19.13	-0.16	2	10	0.8	49:34.0
394162.1	4781104	18.6	-0.07	2	10	0.8	50:19.7
394161.9	4781105	18.4	0.21	2	10	0.8	50:20.7
394161.9	4781105	18.6	0.21	2	10	0.8	50:21.7

394161.9	4781106	19.5	-0.2	2	10	0.8	50:22.7
394161.8	4781107	20.5	-0.41	2	10	0.8	50:23.7
394161.6	4781107	21	-0.45	2	10	0.8	50:24.7
394161.6	4781108	20.53	-0.65	2	10	0.8	50:25.7
394161.5	4781108	19.5	-1.18	2	10	0.8	50:26.6
394161.4	4781109	18.8	-1.36	2	10	0.8	50:27.6
394161.4	4781110	19.05	-0.8	2	10	0.8	50:28.6
394161.6	4781110	19.4	-0.16	2	10	0.8	50:29.6
394161.6	4781111	19.1	-0.05	2	10	0.8	50:30.6
394161.5	4781111	18.4	-0.36	2	10	0.8	50:31.6
394161.3	4781112	18.03	-0.65	2	10	0.8	50:32.5
394161.4	4781113	18.6	-0.61	2	10	0.8	50:33.5
394161.5	4781113	19.4	-0.32	2	10	0.9	50:34.5
394161.3	4781114	20.1	-0.16	2	10	0.8	50:35.5
394161.4	4781114	20.5	-0.13	2	10	0.8	50:36.5
394161.3	4781115	20.6	-0.19	2	10	0.8	50:37.5
394161.3	4781115	20.5	-0.27	2	10	0.8	50:38.4
394161.4	4781116	20.4	-0.36	2	10	0.8	50:39.4
394161.2	4781117	20.18	-0.4	2	10	0.8	50:40.4
394161.3	4781117	19.93	-0.36	2	10	0.8	50:41.4
394161.2	4781118	19.7	-0.36	2	10	0.8	50:42.4
394161.2	4781118	19.3	-0.4	2	10	0.8	50:43.4
394161.3	4781119	19.1	-0.4	2	10	0.8	50:44.4
394161.2	4781119	19.3	-0.33	2	10	0.8	50:45.3
394160.9	4781119	19.7	-0.24	2	10	0.8	50:46.3
394161.1	4781120	19.8	-0.17	2	10	0.8	50:47.3
394161	4781120	19.6	-0.3	2	10	0.8	50:48.3
394160.8	4781121	19.83	-0.34	2	10	0.8	50:49.3
394160.5	4781121	20.1	-0.31	2	10	0.8	50:50.3
394160.6	4781121	20.3	-0.32	2	10	0.8	50:51.2
394160.7	4781122	20.7	-0.38	2	10	0.8	50:52.2
394160.6	4781122	21.1	-0.43	2	10	0.8	50:54.2
394160.8	4781123	21.1	-0.47	2	10	0.8	50:55.2
394160.8	4781123	21.5	-0.41	2	10	0.8	50:56.2
394160.8	4781124	21.7	-0.32	2	10	0.8	50:57.2
394160.7	4781124	21.9	-0.36	2	10	0.8	50:58.1
394160.7	4781125	21.8	-0.41	2	10	0.8	50:59.1
394161	4781125	21.88	-0.28	2	10	0.8	51:00.1
394161.1	4781126	21.7	-0.26	2	10	0.8	51:01.1
394161.3	4781127	21.03	-0.49	2	10	0.8	51:02.1
394161.3	4781127	20.7	-0.64	2	10	0.8	51:03.1
394160.3	4781127	21.1	-0.44	2	9	0.9	51:36.5
394160.2	4781126	21.4	-0.24	2	9	0.9	51:37.5
394160.3	4781126	21.2	-0.06	2	9	0.9	51:38.5
394160.2	4781125	20.5	-0.21	2	9	0.9	51:39.5
394160.2	4781124	20.3	-0.27	2	9	0.9	51:40.5
394160.2	4781123	20.4	-0.35	2	9	0.9	51:41.5

394160.3	4781123	20.53	-0.38	2	9	0.9	51:42.4
394160.2	4781122	20.4	-0.39	2	9	0.9	51:43.4
394160.2	4781122	20.2	-0.22	2	9	0.9	51:44.4
394160.1	4781121	19.7	-0.26	2	9	0.9	51:45.4
394159.9	4781120	19.1	-0.47	2	9	0.9	51:46.4
394160.1	4781119	19.13	-0.54	2	9	0.9	51:47.4
394160	4781119	19.53	-0.54	2	9	0.9	51:48.3
394159.9	4781118	19.7	-0.47	2	9	0.9	51:49.3
394159.9	4781118	19.6	-0.39	2	9	0.9	51:50.3
394159.7	4781117	19.1	-0.44	2	9	0.9	51:51.3
394159.8	4781116	18.8	-0.86	2	9	0.9	51:52.3
394159.7	4781116	18.8	-1.09	2	9	0.9	51:53.3
394159.7	4781115	19	-0.64	2	9	0.9	51:54.3
394159.9	4781116	19.4	-0.24	2	9	0.9	51:57.2
394160.1	4781115	18.7	-0.7	2	9	0.9	52:00.2
394160.2	4781115	19	-0.32	2	9	0.9	52:01.1
394160.1	4781114	19.6	-0.16	2	9	0.9	52:02.1
394160.1	4781114	20.2	-0.04	2	9	0.9	52:03.1
394159.9	4781113	21.2	0.03	2	9	0.9	52:04.1
394159.9	4781112	22.3	0.41	2	9	0.9	52:05.1
394159.7	4781112	22.73	0.33	2	9	0.9	52:06.1
394159.4	4781111	22.1	-0.26	2	9	0.9	52:07.1
394159.2	4781110	20.6	-0.78	2	9	0.9	52:08.0
394158.9	4781109	20.5	-0.39	2	9	0.9	52:09.0
394158.7	4781109	19.9	-0.29	2	9	0.9	52:10.0
394158.6	4781108	18.9	-0.45	2	9	0.9	52:11.0
394158.6	4781108	18.45	-0.54	2	9	0.9	52:12.0
394158.6	4781107	18.7	-0.41	2	9	0.9	52:13.0
394158.6	4781107	19	-0.3	2	9	0.9	52:13.9
394158.6	4781106	19.03	-0.29	2	9	0.9	52:14.9
394158.6	4781105	18.75	-0.38	2	9	0.9	52:15.9
394158.5	4781105	18.6	-0.31	2	9	0.9	52:16.9
394158.5	4781104	17.9	-0.35	2	9	0.9	52:17.9
394158.5	4781103	17.73	-0.39	2	9	0.9	52:18.9
394158.5	4781102	18.2	-0.32	2	9	0.9	52:19.8
394158.5	4781102	18.53	-0.34	2	9	0.9	52:20.8
394158.6	4781101	18.2	-0.58	2	9	0.9	52:21.8
394158.5	4781101	18.1	-0.63	2	9	0.9	52:22.8
394158.4	4781100	18.5	-0.62	2	9	0.9	52:23.8
394158.4	4781100	18.88	-0.52	2	9	0.9	52:25.7
394158.5	4781099	18.93	-0.5	2	9	0.9	52:26.7
394158.4	4781099	18.7	-0.61	2	9	0.9	52:27.7
394158.6	4781098	18.58	-0.59	2	9	0.9	52:28.7
394158.5	4781098	18.9	-0.46	2	9	0.9	52:29.7
394158.4	4781097	18.9	-0.37	2	9	0.9	52:30.7
394158.5	4781097	18.63	-0.38	2	9	0.9	52:31.7
394158.4	4781097	18.3	-0.49	2	10	0.8	52:34.6

394158.7	4781097	18.5	-0.34	2	10	0.8	52:35.6
394158.7	4781097	18.7	-0.38	2	10	0.8	52:36.6
394159.1	4781097	18.6	-0.44	2	9	0.9	52:39.5
394159.1	4781097	18.8	-0.33	2	9	0.9	52:40.5
394159.4	4781096	18.9	-0.3	2	10	0.8	52:41.5
394159.4	4781096	18.9	-0.34	2	10	0.8	52:42.5
394159.2	4781095	19	-0.22	2	10	0.8	52:43.5
394158.7	4781094	18.7	-0.26	2	10	0.8	52:44.4
394158.3	4781094	18.6	-0.37	2	10	0.8	52:45.4
394158	4781094	18.6	-0.44	2	10	0.8	52:46.4
394157.8	4781093	18.7	-0.37	2	10	0.8	52:47.4
394157.7	4781093	19.1	-0.39	2	10	0.8	52:48.4
394157.8	4781093	18.8	-0.45	2	10	0.8	52:49.4
394157.7	4781092	18.78	-0.39	2	10	0.8	52:50.3
394157.4	4781092	18.8	-0.4	2	10	0.8	52:51.3
394157.3	4781092	18.4	-0.57	2	10	0.8	52:54.3
394157.3	4781092	18.93	-0.46	2	10	0.8	52:55.3
394157.2	4781091	19.6	-0.36	2	10	0.8	52:56.3
394157.1	4781090	19.53	-0.48	2	10	0.8	52:57.2
394156.7	4781089	19.5	-0.47	2	10	0.8	52:58.2
394156.8	4781089	20	-0.4	2	10	0.8	52:59.2
394156.9	4781088	20.3	-0.37	2	10	0.8	53:00.2
394156.9	4781088	20.2	-0.41	2	10	0.8	53:01.2
394156.8	4781087	20.3	-0.34	2	10	0.8	53:02.2
394156.6	4781086	20.7	-0.33	2	10	0.8	53:03.1
394156.5	4781086	20.7	-0.28	2	10	0.8	53:04.1
394156.5	4781086	20.7	-0.27	2	10	0.8	53:05.1
394156.5	4781085	20.9	-0.19	2	10	0.8	53:06.1
394156.5	4781084	21	-0.01	2	10	0.8	53:07.1
394156.3	4781084	20.9	-0.02	2	10	0.8	53:08.1
394156.3	4781083	21	-0.08	2	10	0.8	53:09.1
394156.2	4781083	20.8	-0.09	2	10	0.8	53:10.0
394156.1	4781082	20.9	0.01	2	10	0.8	53:11.0
394156	4781082	20.88	0.16	2	10	0.8	53:12.0
394155.7	4781081	20.63	0.05	2	10	0.8	53:13.0
394155.2	4781087	19.8	-0.41	2	9	1	54:02.3
394155	4781088	19.5	-0.43	2	9	1	54:03.3
394154.8	4781088	19.4	-0.39	2	9	1	54:04.2
394154.9	4781089	19.2	-0.41	2	9	1	54:05.2
394154.9	4781089	19.1	-0.56	2	9	1	54:06.2
394154.9	4781090	19.6	-0.4	2	9	1	54:07.2
394154.9	4781090	19.8	-0.37	2	9	1	54:08.2
394154.9	4781091	19.33	-0.46	2	9	1	54:09.2
394155	4781091	19	-0.52	2	9	1	54:10.1
394155	4781092	18.9	-0.51	2	9	1	54:11.1
394155.1	4781093	19.05	-0.34	2	9	1	54:12.1
394155.2	4781093	18.9	-0.36	2	9	1	54:13.1

394155.3	4781094	18.5	-0.43	2	9	1	54:14.1
394155.4	4781094	18.28	-0.47	2	9	1	54:15.1
394155.3	4781095	18.3	-0.47	2	9	1	54:16.1
394155.2	4781095	18.3	-0.48	2	9	1	54:17.0
394155.1	4781096	18.4	-0.45	2	9	1	54:18.0
394155.2	4781096	18.25	-0.43	2	9	1	54:19.0
394154.9	4781097	18	-0.54	2	9	1	54:20.0
394154.6	4781097	17.6	-0.51	2	9	1	54:21.0
394154.4	4781098	17.5	-0.46	2	9	1	54:22.0
394154.4	4781099	17.4	-0.43	2	9	1	54:22.9
394154.4	4781099	17.1	-0.49	2	9	1	54:23.9
394154.5	4781099	17.2	-0.35	2	9	1	54:24.9
394154.8	4781100	17.4	-0.19	2	9	1	54:25.9
394154.8	4781101	17.4	-0.26	2	9	1	54:26.9
394154.7	4781101	17.03	-0.43	2	9	1	54:27.9
394154.8	4781101	17	-0.49	2	9	1	54:28.9
394154.4	4781102	17.4	-0.29	2	9	1	54:29.8
394154.4	4781102	17.5	-0.18	2	9	1	54:30.8
394154.4	4781103	17.38	-0.36	2	9	1	54:31.8
394154.3	4781103	17.2	-0.52	2	9	1	54:32.8
394154.6	4781104	17.3	-0.7	2	9	1	54:33.8
394154.3	4781105	17.8	-0.52	2	9	1	54:34.8
394154.3	4781105	18.2	-0.31	2	9	1	54:35.7
394154.1	4781105	18.2	-0.37	2	9	1	54:36.7
394154.2	4781106	18.4	-0.57	2	9	1	54:37.7
394154.3	4781106	18.9	-0.49	2	9	1	54:38.7
394154.1	4781107	19.3	-0.57	2	9	1	54:39.7
394154	4781107	19.1	-0.61	2	9	1	54:41.6
394154.1	4781107	18.9	-1.84	2	9	1	54:43.6
394154.1	4781108	18.33	-2.08	2	9	1	54:44.6
394154.2	4781108	19.63	-0.71	2	9	1	54:46.6
394154.2	4781109	19.88	-0.76	2	9	1	54:47.6
394154.1	4781109	20.68	-0.58	2	9	1	54:48.5
394154.3	4781110	20.2	-0.75	2	9	1	54:49.5
394154.1	4781110	19.8	-0.59	2	9	1	54:50.5
394154	4781111	18.2	-0.98	2	9	1	54:51.5
394153.9	4781111	18.3	-0.89	2	9	1	54:52.5
394154	4781112	17.85	-0.86	2	9	1	54:53.5
394154	4781112	17.55	-0.83	2	9	1	54:54.5
394153.8	4781113	17.6	-0.79	2	9	1	54:55.4
394153.7	4781113	17.7	-0.94	2	9	1	54:56.4
394153.6	4781114	17.6	-0.98	2	8	1	54:57.4
394153.5	4781114	17.9	-0.81	2	8	1	54:58.4
394153.6	4781114	18.6	-0.77	2	8	1	54:59.4
394153.6	4781115	19.1	-0.46	2	9	1	55:06.3
394153.8	4781115	19.3	-0.42	2	9	1	55:07.3
394153.8	4781116	19.23	-0.49	2	9	1	55:08.2

394153.8	4781116	19.4	-0.4	2	9	1	55:10.2
394153.5	4781116	19.5	-0.29	2	9	1	55:11.2
394153.5	4781117	19.6	-0.49	2	9	1	55:12.2
394153.5	4781117	19.85	-0.35	2	9	1	55:13.2
394153.4	4781118	19.8	-0.37	2	9	1	55:14.1
394153.3	4781118	19	-0.76	2	9	1	55:15.1
394153.2	4781119	18.5	-0.89	2	9	1	55:16.1
394153.2	4781119	18.4	-1.19	2	9	1	55:17.1
394153.1	4781120	18.5	-1.34	2	9	1	55:18.1
394153.1	4781120	18.6	-1.16	2	9	1	55:19.1
394153	4781121	18.9	-1.14	2	9	1	55:20.1
394153.3	4781122	18.93	-1.24	2	9	1	55:21.0
394153.3	4781122	19.2	-0.85	2	9	1	55:22.0
394153.4	4781123	19.1	-0.58	2	9	1	55:23.0
394153.5	4781123	18.9	-0.59	2	9	1	55:24.0
394153.6	4781124	18.45	-0.59	2	9	1	55:25.0
394153.6	4781125	18.1	-0.52	2	9	1	55:26.0
394153.8	4781125	18.1	-0.66	2	9	1	55:26.9
394153.7	4781126	18	-0.81	2	9	1	55:27.9
394152.4	4781128	16.3	-0.52	2	9	1	57:20.5
394152.3	4781128	16.1	-0.52	2	9	1	57:21.5
394152.3	4781127	15.6	-0.73	2	9	1	57:22.5
394152.4	4781127	15.9	-0.66	2	9	1	57:23.4
394152.3	4781126	16.3	-0.51	2	9	1	57:24.4
394152.1	4781126	16.9	-0.51	2	9	1	57:25.4
394152.2	4781125	17.7	-0.36	2	9	1	57:26.4
394152.4	4781124	17.4	-0.6	2	9	1	57:27.4
394152.2	4781124	16.7	-0.76	2	8	1	57:28.4
394152	4781123	16.5	-0.72	2	8	1	57:29.3
394152	4781123	16.9	-0.73	2	8	1	57:30.3
394152	4781122	17.7	-0.62	2	8	1	57:31.3
394151.9	4781122	18.5	-0.56	2	8	1	57:32.3
394152	4781121	19.1	-0.55	2	8	1	57:33.3
394152	4781120	19.5	-0.61	2	8	1	57:34.3
394152.2	4781120	19.6	-0.68	2	8	1	57:35.2
394152.5	4781120	20.2	-0.55	2	8	1	57:36.2
394152.5	4781119	20.6	-0.48	2	8	1	57:37.2
394152.5	4781118	20.6	-0.47	2	8	1	57:38.2
394152.4	4781118	20.4	-0.5	2	8	1	57:39.2
394152.3	4781117	19.9	-0.51	2	8	1	57:40.2
394152.5	4781117	19.1	-0.66	2	8	1	57:41.2
394152.6	4781116	18.55	-0.85	2	8	1	57:42.1
394152.8	4781116	19.33	-0.66	2	9	1	57:43.1
394152.9	4781115	20.08	-0.4	2	9	1	57:44.1
394153.1	4781115	20.1	-0.36	2	9	1	57:45.1
394153.4	4781114	20.2	-0.28	2	9	1	57:46.1
394153.6	4781113	20.23	-0.46	2	9	1	57:47.1

394153.8	4781113	20.8	-0.1	2	9	1	57:48.1
394154.1	4781112	20.9	-0.1	2	9	1	57:49.0
394154.3	4781112	20	-0.39	2	9	1	57:50.0
394154.4	4781111	19.8	-0.42	2	9	1	57:51.0
394154.6	4781111	20.1	-0.34	2	9	1	57:52.0
394154.6	4781111	19.85	-0.47	2	9	1	57:53.0
394154.5	4781110	20	-0.45	2	9	1	57:54.0
394154.5	4781110	20.2	-0.34	2	9	1	57:54.9
394154.6	4781109	19.88	-0.46	2	9	1	57:55.9
394154.8	4781109	19.5	-0.57	2	9	1	57:56.9
394154.8	4781108	19.08	-0.58	2	9	1	57:57.9
394154.8	4781108	18.2	-0.67	2	9	1	57:58.9
394154.9	4781107	17.9	-0.65	2	9	1	57:59.9
394155	4781107	17.6	-0.56	2	9	1	58:00.9
394155	4781106	17.2	-0.48	2	9	1	58:01.8
394155.3	4781106	17	-0.5	2	9	1	58:02.8
394155.4	4781105	16.8	-0.65	2	9	1	58:03.8
394155.9	4781105	15.2	-1.3	2	9	1	58:05.8
394156.2	4781104	15.8	-1.45	2	9	1	58:06.8
394156.3	4781104	17.38	-0.41	2	9	1	58:07.7
394156.5	4781103	17.33	-0.36	2	9	1	58:08.7
394156.5	4781102	17.1	-0.34	2	9	1	58:09.7
394156.3	4781102	17.2	-0.43	2	9	1	58:10.7
394156.3	4781102	17.3	-0.54	2	9	1	58:11.7
394156.3	4781101	17.4	-0.43	2	9	1	58:12.7
394155.9	4781101	17.3	-0.51	2	9	1	58:13.7
394156	4781100	17.55	-0.41	2	8	1	58:16.6
394155.8	4781100	17.53	-0.46	2	8	1	58:17.6
394155.8	4781099	17.5	-0.52	2	9	1	58:18.6
394155.5	4781099	17.53	-0.55	2	9	1	58:19.6
394155.3	4781098	17.4	-0.72	2	9	1	58:20.6
394155.2	4781098	17.6	-0.65	2	9	1	58:21.5
394155.2	4781097	18.1	-0.44	2	9	1	58:22.5
394155.3	4781097	18.2	-0.5	2	9	1	58:23.5
394155.4	4781096	17.9	-0.62	2	9	1	58:24.5
394155.5	4781095	18.2	-0.64	2	9	1	58:25.5
394155.8	4781095	18.6	-0.47	2	9	1	58:26.5
394155.9	4781095	18.6	-0.47	2	9	1	58:27.4
394156.2	4781094	18.7	-0.37	2	9	1	58:28.4
394156.1	4781093	19.2	-0.31	2	9	1	58:29.4
394156.2	4781093	19.5	-0.35	2	9	1	58:30.4
394156.1	4781092	19.53	-0.44	2	9	1	58:31.4
394156.3	4781092	19.63	-0.49	2	9	1	58:34.3
394156.3	4781091	19.6	-0.39	2	9	1	58:35.3
394156.4	4781091	19	-0.48	2	9	1	58:36.3
394156.4	4781090	18.5	-0.52	2	9	1	58:37.3
394156.2	4781090	18.9	-0.53	2	9	1	58:38.3

394156	4781089	19.5	-0.41	2	9	1	58:39.3
394155.8	4781089	19.7	-0.41	2	9	1	58:40.2
394153	4781089	18.6	-0.42	2	9	1	58:59.5
394152.9	4781090	18.4	-0.41	2	9	1	59:00.5
394153.1	4781090	17.9	-0.46	2	9	1	59:01.5
394152.7	4781091	17.7	-0.54	2	9	1	59:02.4
394152.8	4781091	17.4	-0.51	2	9	1	59:03.4
394152.8	4781091	17.3	-0.51	2	9	1	59:04.4
394152.9	4781092	17.5	-0.57	2	9	1	59:05.4
394153	4781092	17.7	-0.5	2	9	1	59:06.4
394153	4781093	18	-0.59	2	9	1	59:07.4
394153.1	4781094	18	-0.65	2	9	1	59:08.3
394152.8	4781094	17.95	-0.55	2	9	1	59:09.3
394152.8	4781095	18.45	-0.39	2	9	1	59:10.3
394152.8	4781095	18.6	-0.4	2	9	1	59:11.3
394152.8	4781096	17.8	-0.56	2	9	1	59:12.3
394153	4781096	17.45	-0.67	2	9	1	59:13.3
394152.9	4781097	17.35	-0.66	2	9	1	59:14.3
394153	4781097	17.55	-0.47	2	9	1	59:15.2
394153	4781098	17.4	-0.51	2	9	1	59:16.2
394153	4781098	17.2	-0.6	2	9	1	59:17.2
394152.9	4781099	17.1	-0.59	2	9	1	59:18.2
394152.9	4781099	16.63	-0.61	2	9	1	59:19.2
394152.8	4781100	16.2	-0.58	2	9	1	59:20.2
394152.7	4781100	16.3	-0.42	2	9	1	59:21.1
394152.7	4781100	16.6	-0.27	2	9	1	59:22.1
394152.7	4781101	16.73	-0.28	2	9	1	59:23.1
394152.6	4781101	16.3	-0.48	2	9	1	59:24.1
394152.4	4781101	16.3	-0.44	2	9	1	59:25.1
394152.2	4781101	16.4	-0.2	2	8	1	59:27.1
394152.2	4781101	15.3	-1.36	2	9	1	59:29.0
394152.3	4781102	15.7	-0.8	2	9	1	59:30.0
394152.2	4781102	16.7	-0.7	2	9	1	59:31.0
394151.9	4781103	17.3	-0.35	2	9	1	59:32.0
394151.7	4781103	17.6	-0.07	2	9	1	59:33.0
394151.5	4781103	17.9	-0.18	2	9	1	59:33.9
394151.4	4781104	17.9	-0.36	2	9	1	59:34.9
394151.1	4781104	18.28	0.09	2	9	1	59:37.9
394151	4781105	18	0.18	2	9	1	59:38.9
394150.6	4781105	17.8	0.52	2	9	1	59:39.9
394150.4	4781105	18.1	0.82	2	9	1	59:40.8
394150.2	4781106	18.8	1.37	2	9	1	59:41.8
394149.9	4781107	19.28	1.92	2	9	1	59:42.8
394149.7	4781107	19.9	2.32	2	9	1	59:43.8
394149.9	4781108	19.7	2	2	9	1	59:44.8
394149.8	4781108	18.8	1.14	2	9	1	59:45.8
394149.9	4781109	18.9	0.92	2	9	1	59:46.8

394149.9	4781109	19.3	0.95	2	9	1	59:47.8
394150.2	4781109	19.8	0.83	2	9	1	59:48.7
394150.4	4781110	19.8	0.39	2	9	1	59:49.7
394150.4	4781110	19.13	-0.17	2	9	1	59:51.7
394150.2	4781110	18	-0.19	2	9	1	59:54.6
394150.4	4781111	18.78	0.02	2	9	1	59:55.6
394150.6	4781111	19.3	0.05	2	9	1	59:56.6
394150.7	4781112	19.6	-0.03	2	9	1	59:57.6
394150.9	4781112	18.7	-0.39	2	9	1	59:58.6
394151.2	4781113	18.1	-0.55	2	9	1	59:59.6
394151	4781113	18.7	-0.38	2	9	1	00:00.6
394151.1	4781114	19.13	-0.27	2	9	1	00:01.5
394150.6	4781114	19.3	-0.32	2	9	1	00:02.5
394150.5	4781115	19.2	-0.46	2	9	1	00:03.5
394150.2	4781115	19.2	-0.63	2	9	1	00:04.5
394149.9	4781116	19.3	-0.64	2	9	1	00:05.5
394150	4781117	19.1	-0.76	2	9	1	00:06.5
394149.9	4781117	18.8	-0.76	2	9	1	00:07.4
394149.8	4781117	18.2	-0.73	2	9	1	00:08.4
394149.9	4781118	18.3	-0.59	2	9	1	00:09.4
394150.2	4781118	17.9	-0.75	2	9	1	00:10.4
394149.9	4781119	17.3	-0.8	2	9	1	00:11.4
394150	4781119	17.2	-0.63	2	9	1	00:12.4
394150	4781120	17.4	-0.51	2	9	1	00:13.4
394150.3	4781120	17.2	-0.57	2	9	1	00:14.3
394150.6	4781121	16.9	-0.79	2	9	1	00:15.3
394150.6	4781121	16.9	-0.64	2	9	1	00:16.3
394150.3	4781122	15.7	-0.71	2	9	1	00:17.3
394150	4781122	15.2	-0.76	2	9	1	00:18.3
394149.9	4781123	15.9	-0.55	2	9	1	00:19.3
394149.6	4781123	16.7	-0.39	2	9	1	00:20.2
394149.3	4781123	16.9	-0.45	2	9	1	00:21.2
394146	4781126	16.7	-0.39	2	9	1	01:43.2
394146.1	4781126	16.6	-0.37	2	9	1	01:44.2
394146.1	4781125	16.7	-0.39	2	9	1	01:45.1
394146.1	4781125	17.2	-0.38	2	8	1	01:55.0
394146	4781124	17.2	-0.35	2	8	1	01:56.0
394146.1	4781124	17.2	-0.41	2	8	1	01:57.0
394146.4	4781123	17.4	-0.47	2	8	1	01:57.9
394146.6	4781123	17.2	-0.37	2	8	1	01:58.9
394146.8	4781122	16.7	-0.4	2	8	1	01:59.9
394146.7	4781121	16.2	-0.46	2	9	1	02:00.9
394146.6	4781121	16.3	-0.37	2	9	1	02:01.9
394146.5	4781120	16.6	-0.31	2	9	1	02:02.9
394146.4	4781120	16.6	-0.39	2	9	1	02:03.8
394146.2	4781119	16.7	-0.44	2	9	1	02:04.8
394146.1	4781119	16.83	-0.41	2	9	1	02:05.8

394146.2	4781118	16.83	-0.28	2	9	1	02:06.8
394146	4781118	16.7	-0.39	2	9	1	02:07.8
394146.1	4781117	16.7	-0.41	2	9	1	02:08.8
394146.3	4781116	16.7	-0.35	2	8	1	02:09.8
394146.2	4781115	16.5	-0.28	2	8	1	02:10.7
394146.1	4781115	16.6	-0.14	2	8	1	02:11.7
394146	4781114	16.88	0.03	2	8	1	02:12.7
394145.7	4781113	17.2	0.43	2	8	1	02:13.7
394145.5	4781113	17.6	1.2	2	8	1	02:14.7
394145.6	4781112	18.7	3.2	2	8	1	02:15.7
394145.6	4781111	20.4	7.68	2	8	1	02:16.7
394145.7	4781110	18.23	4.99	2	8	1	02:17.7
394145.9	4781110	3.75	-20.47	2	8	1	02:18.6
394146	4781109	-14.88	-20.47	2	9	1	02:19.6
394146	4781108	-19.6	-20.47	2	9	1	02:20.6
394146.2	4781108	-18.9	-20.47	2	9	1	02:21.6
394146.1	4781107	-18.8	-20.47	2	9	1	02:22.6
394146.4	4781107	-7.8	-20.47	2	9	1	02:24.6
394146.4	4781107	-0.8	-20.47	2	9	1	02:25.6
394146.7	4781106	7.95	-20.47	2	9	1	02:26.6
394146.9	4781106	20.8	-1.24	2	9	1	02:27.6
394147.5	4781105	22.85	13.2	2	9	1	02:28.6
394147.9	4781105	21.1	10.35	2	9	1	02:29.6
394148.1	4781104	18.7	4.81	2	9	1	02:30.6
394148.3	4781104	17.3	1.93	2	9	1	02:31.6
394148.4	4781103	16.7	1.04	2	9	1	02:32.6
394148.5	4781103	16.5	0.55	2	9	1	02:33.5
394148.4	4781103	15.6	-0.13	2	9	1	02:35.5
394148.6	4781101	15.7	-0.14	2	9	1	02:49.7
394148.7	4781101	15.8	-0.14	2	9	1	02:50.6
394149	4781100	15.5	-0.27	2	9	1	02:51.6
394149.1	4781100	14.8	-0.64	2	9	1	02:52.6
394148.9	4781100	15.1	-0.59	2	9	1	02:53.6
394149.1	4781100	15.7	-0.31	2	9	1	02:54.6
394149.3	4781099	15.9	-0.38	2	9	1	02:55.6
394149.3	4781098	16.2	-0.38	2	9	1	02:56.5
394149.4	4781098	16.4	-0.38	2	9	1	02:57.5
394149.4	4781097	16.3	-0.43	2	9	1	02:58.5
394149.5	4781097	16.63	-0.46	2	9	1	02:59.5
394149.7	4781096	17.1	-0.43	2	9	1	03:00.5
394149.6	4781095	17.1	-0.42	2	9	1	03:01.5
394149.5	4781095	17.2	-0.38	2	9	1	03:02.5
394149.7	4781094	17.1	-0.43	2	9	1	03:03.4
394149.7	4781093	17.5	-0.38	2	8	1	03:04.4
394149.7	4781093	17.9	-0.28	2	8	1	03:05.4
394149.6	4781092	17.9	-0.24	2	8	1	03:06.4
394149.4	4781092	17.9	-0.26	2	8	1	03:07.4

394149.5	4781091	17.63	-0.37	2	8	1	03:08.4
394149.4	4781090	17.63	-0.29	2	8	1	03:09.3
394149.1	4781089	17.8	-0.26	2	8	1	03:10.3
394149.3	4781089	18.1	-0.32	2	8	1	03:11.3
394149.3	4781088	18.2	-0.38	2	8	1	03:12.3
394149.5	4781088	18.6	-0.32	2	8	1	03:13.3
394149.6	4781087	19.4	-0.14	2	8	1	03:14.3
394149.6	4781086	19.5	-0.35	2	8	1	03:15.2
394149.7	4781086	19.5	-0.47	2	8	1	03:16.2
394149.9	4781085	19.53	-0.5	2	8	1	03:17.2
394150	4781085	20.2	-0.44	2	8	1	03:18.2
394150.1	4781085	20.7	-0.37	2	8	1	03:19.2
394149.9	4781084	20.6	-0.27	2	8	1	03:20.2
394150	4781084	20.2	-0.38	2	8	1	03:21.2
394149.9	4781083	19.5	-0.36	2	8	1	03:22.1
394149.7	4781083	18.9	-0.22	2	8	1	03:23.1
394146.2	4781074	11.2	-5.53	2	7	1.1	04:02.0
394146.1	4781074	14.2	-0.71	2	7	1.1	04:03.0
394146	4781074	16.7	1.58	2	8	1	04:04.0
394145.9	4781075	17.3	1	2	9	1	04:05.0
394145.9	4781076	16.9	0.14	2	9	1	04:06.0
394146	4781076	15.3	-1.08	2	9	1	04:07.0
394146.1	4781077	13.3	-1.79	2	9	1	04:08.0
394146.3	4781078	14.3	0.18	2	9	1	04:08.9
394146.5	4781079	14.7	1.37	2	9	1	04:09.9
394146.5	4781079	13.5	-0.78	2	9	1	04:10.9
394146.3	4781080	15.35	-1.73	2	9	1	04:11.9
394146.2	4781081	16.98	0.33	2	9	1	04:12.9
394146	4781082	17.4	1.22	2	9	1	04:13.9
394145.8	4781083	16.9	0.89	2	9	1	04:14.9
394145.6	4781084	16.9	-0.51	2	9	1	04:15.8
394145.6	4781084	17.1	-0.64	2	9	1	04:16.8
394145.5	4781085	17.5	0.04	2	9	1	04:17.8
394145.4	4781086	16.8	-0.11	2	9	1	04:18.8
394145.4	4781087	16.4	-0.24	2	9	1	04:19.8
394145.4	4781088	16.3	-0.22	2	9	1	04:20.8
394145.5	4781089	16	-0.37	2	9	1	04:21.8
394145.4	4781090	16.6	-0.33	2	9	1	04:22.7
394145.3	4781090	16.5	-0.35	2	9	1	04:23.7
394145.4	4781091	16.5	-0.32	2	9	1	04:24.7
394145.4	4781092	16.4	-0.25	2	9	1	04:25.7
394145.2	4781093	15.8	-0.28	2	9	1	04:26.7
394145.2	4781094	15.2	-0.31	2	9	1	04:27.7
394145.2	4781094	15.2	-0.27	2	9	1	04:28.6
394145.2	4781095	15.3	-0.23	2	9	1	04:29.6
394145.1	4781096	15.3	-0.27	2	9	1	04:30.6
394145.3	4781096	15.2	-0.29	2	9	1	04:31.6

394145.1	4781097	15	-0.39	2	8	1	04:32.6
394144.9	4781098	15	-0.4	2	8	1.4	04:33.6
394145	4781099	15.4	-0.27	2	9	1	04:34.6
394144.7	4781099	15.7	-0.27	2	9	1	04:35.5
394144.5	4781100	15.9	0.09	2	9	1	04:36.5
394144.6	4781101	16	0.6	2	9	1	04:37.5
394144.3	4781101	16.6	1.64	2	9	1	04:38.5
394144.7	4781102	17.7	3.2	2	9	1	04:39.5
394144.6	4781103	19	6.13	2	9	1	04:40.5
394144.7	4781103	18.2	6.41	2	9	1	04:41.5
394144.4	4781104	12.55	-7.57	2	9	1	04:42.5
394144.3	4781105	-1.3	-20.47	2	9	1	04:43.4
394144.3	4781106	-14.28	-20.47	2	9	1	04:44.4
394144.1	4781106	-17.4	-20.47	2	9	1	04:45.4
394144.1	4781107	-23.7	-20.47	2	9	1	04:46.4
394144	4781107	-21.45	-20.47	2	9	1	04:47.4
394143.7	4781108	0.1	-20.47	2	9	1	04:48.4
394143.8	4781109	24.35	2.57	2	9	1	04:49.4
394143.7	4781109	26.73	19.75	2	9	1	04:50.4
394143.6	4781110	20.7	9.04	2	9	1	04:51.4
394143.7	4781111	17.5	1.32	2	9	1	04:52.4
394143.4	4781112	16.6	-0.19	2	9	1	04:53.4
394142.9	4781112	16.2	-0.21	2	9	1	04:54.4
394142.6	4781113	15.7	-0.19	2	9	1	04:55.4
394142.3	4781114	15.6	-0.3	2	9	1	04:56.3
394142	4781114	15.7	-0.44	2	9	1	04:57.3
394142	4781115	16.15	-0.5	2	9	1	04:58.3
394141.7	4781116	16.35	-0.52	2	9	1	04:59.3
394141.8	4781116	16.2	-0.57	2	9	1	05:00.3
394141.6	4781117	15.88	-0.63	2	9	1	05:01.3
394141.5	4781117	15.9	-0.51	2	9	1	05:02.2
394141.5	4781118	16	-0.33	2	9	1	05:03.2
394141.9	4781114	15.98	-0.39	2	9	1	05:45.9
394142	4781114	16.2	-0.29	2	9	1	05:46.9
394142	4781113	16	-0.22	2	9	1	05:47.8
394141.9	4781112	15.95	-0.02	2	9	1	05:48.8
394141.9	4781112	16.2	0.27	2	9	1	05:49.8
394141.9	4781111	16.2	0.58	2	9	1	05:50.8
394141.8	4781111	16.6	1.14	2	9	1	05:51.8
394141.8	4781110	17.4	1.41	2	9	1	05:52.8
394141.8	4781110	18.35	1.74	2	9	1	05:53.8
394141.8	4781109	19.5	2.32	2	9	1	05:54.8
394141.9	4781109	20.5	2.52	2	9	1	05:55.7
394141.9	4781109	21.6	3.41	2	9	1	05:56.7
394141.9	4781108	21.5	4.06	2	9	1	05:57.7
394142.1	4781108	21.9	5.78	2	9	1	05:58.7
394142.2	4781107	21.8	6.72	2	9	1	05:59.7

394142.3	4781106	21.83	7.68	2	9	1	06:00.7
394142.4	4781106	21.6	7.13	2	9	1	06:01.7
394142.3	4781105	20.53	5.65	2	9	1	06:02.7
394142	4781105	19.35	3.96	2	9	1	06:03.7
394141.9	4781104	18.3	1.94	2	9	1	06:04.7
394141.7	4781104	17.43	0.43	2	9	1	06:05.7
394141.5	4781103	17.8	-0.04	2	9	1	06:06.6
394141.1	4781102	18.5	-0.16	2	9	1	06:07.6
394141.1	4781102	18.8	-0.35	2	9	1	06:08.6
394141.1	4781101	19.38	-0.32	2	9	1	06:09.6
394141	4781101	19.83	-0.22	2	9	1	06:10.6
394141.2	4781101	19.9	0.05	2	9	1	06:11.6
394140.9	4781100	19	-0.45	2	9	1	06:12.5
394140.8	4781100	19.7	0.09	2	9	1	06:13.5
394141.1	4781099	20	0.08	2	9	1	06:14.5
394141.3	4781099	19.8	-0.07	2	9	1	06:15.5
394141.3	4781098	19.4	-0.41	2	9	1	06:16.5
394141.5	4781098	19.5	-0.1	2	9	1	06:17.5
394141.5	4781097	20	0.62	2	9	1	06:18.5
394141.3	4781096	20.48	1.1	2	9	1	06:19.4
394141	4781096	20.1	1.05	2	9	1	06:21.4
394141.2	4781096	20.5	1.4	2	9	1	06:22.4
394141.3	4781095	20.1	0.73	2	9	1	06:23.4
394141.4	4781094	19.68	0.05	2	9	1	06:24.4
394141.6	4781094	19.3	-0.22	2	9	1	06:25.4
394141.8	4781093	17.6	-0.72	2	9	1	06:26.3
394141.7	4781093	16.1	-1.05	2	9	1	06:27.3
394141.9	4781093	15.58	-0.94	2	9	1	06:28.3
394142.2	4781092	15.7	-0.66	2	9	1	06:29.3
394142.2	4781091	15.7	-0.66	2	9	1	06:30.3
394142.5	4781091	15.8	-0.77	2	9	1	06:31.3
394142.5	4781090	16.3	-0.75	2	9	1	06:32.3
394142.8	4781090	16.7	-0.5	2	9	1	06:33.2
394142.7	4781089	16.6	-0.44	2	9	1	06:34.2
394142.9	4781088	16.3	-0.47	2	9	1	06:35.2
394143	4781088	16	-0.45	2	9	1	06:36.2
394143	4781087	16	-0.26	2	9	1	06:37.2
394143	4781087	16	-0.12	2	9	1	06:38.2
394143.2	4781086	16	0.01	2	9	1	06:39.1
394143	4781086	15.8	0.05	2	9	1	06:40.1
394143.1	4781085	16.08	0.05	2	9	1	06:41.1
394143	4781085	16.25	-0.05	2	9	1	06:42.1
394143.2	4781084	16.53	0.05	2	9	1	06:43.1
394143.1	4781084	16.5	-0.1	2	9	1	06:44.1
394143	4781083	16.03	-0.24	2	9	1	06:45.1
394143.2	4781083	16.2	-0.12	2	9	1	06:46.0
394143.2	4781083	16.5	0.11	2	9	1	06:47.0

394143.3	4781082	16.3	0.44	2	9	1	06:48.0
394143.3	4781081	15.7	0.89	2	9	1	06:49.0
394143.1	4781081	13.7	2.66	2	9	1	06:50.0
394143.2	4781080	12.13	4.41	2	9	1	06:51.0
394143.3	4781080	7.33	3.31	2	9	1	06:52.0
394143.4	4781079	5.93	2.41	2	9	1	06:52.9
394143.6	4781079	10.5	2.88	2	9	1	06:53.9
394143.8	4781078	12.58	2.96	2	9	1	06:54.9
394143.9	4781078	12.8	2.94	2	9	1	06:55.9
394144.1	4781077	14.9	2.08	2	9	1	06:56.9
394144.2	4781077	13.23	1.82	2	9	1	06:57.9
394144.4	4781077	11.03	1.97	2	9	1	06:58.9
394144.4	4781077	9.9	1.95	2	9	1	06:59.9
394144.5	4781076	11	1.86	2	9	1	07:00.8
394144.5	4781076	13.5	1.67	2	9	1	07:01.8
394144.5	4781075	14.3	1.49	2	9	1	07:02.8
394144.5	4781075	14.7	1.41	2	9	1	07:03.8
394144.4	4781075	13.6	1.68	2	9	1	07:04.8
394144.4	4781074	10.1	2.56	2	9	1	07:05.8
394144.4	4781074	13.4	2.56	2	9	1	07:06.8
394144.2	4781074	16.2	1.53	2	9	1	07:07.8
394144.1	4781074	17.8	0.58	2	9	1	07:08.7
394144.1	4781073	19	0.3	2	9	1	07:09.7
394144.2	4781073	19.3	0.25	2	9	1	07:10.7
394144.4	4781073	19	0.11	2	9	1	07:11.7
394144.6	4781072	18.4	0.54	2	9	1	07:12.7
394144.4	4781072	18.2	0.55	2	9	1	07:13.7
394144.3	4781072	18.93	0.95	2	9	1	07:14.7
394144.3	4781071	19.35	1.27	2	9	1	07:15.7
394144.2	4781071	19.3	0.65	2	9	1	07:16.6
394144	4781071	21.4	-0.11	2	9	1	07:17.6
394143.9	4781070	22.9	-0.6	2	9	1	07:18.6
394143.9	4781070	23.3	-0.25	2	9	1	07:19.6
394143.3	4781070	23.4	-0.69	2	9	1	07:25.5
394143.3	4781069	23.75	-0.54	2	9	1	07:26.5
394143.3	4781069	24	-0.45	2	9	1	07:27.5
394143.2	4781069	22.4	-0.64	2	9	1	07:28.5
394143.1	4781068	22.2	-0.55	2	7	1.1	07:30.4
394143	4781068	22.4	-0.67	2	7	1.1	07:31.4
394142.7	4781068	22	-0.57	2	8	1	07:32.4
394142.5	4781068	21.4	-0.64	2	8	1	07:33.4
394142.4	4781067	21.3	-0.74	2	7	1	07:34.4
394142.5	4781067	20.9	-0.69	2	8	1	07:35.4
394141.9	4781067	20.1	-0.76	2	9	1	07:36.3
394141.8	4781066	20	-0.8	2	9	1	07:37.3
394141.4	4781066	20.3	-0.69	2	9	1	07:38.3
394141.1	4781065	20.1	-0.82	2	9	1	07:39.3

394140.5	4781065	20.3	-0.68	2	9	1	07:40.3
394140	4781065	20.9	-0.71	2	9	1	07:41.3
394139.7	4781065	21.2	-0.89	2	9	1	07:42.2
394134.7	4781064	20.7	-0.53	2	7	1.4	08:10.2
394134.7	4781064	20.6	-0.59	2	7	1.4	08:11.2
394134.8	4781065	20.38	-0.57	2	9	0.9	08:12.2
394134.9	4781066	20.18	-0.7	2	9	0.9	08:13.2
394135	4781066	20.2	-0.67	2	9	0.9	08:14.2
394135.2	4781067	20.4	-0.62	2	9	0.9	08:15.1
394135.2	4781067	20.48	-0.62	2	9	0.9	08:16.1
394135.2	4781068	20.7	-0.58	2	9	0.9	08:17.1
394135.4	4781068	21	-0.62	2	9	0.9	08:18.1
394135.4	4781069	21.08	-0.57	2	9	0.9	08:19.1
394135.6	4781069	21	-0.65	2	8	1.4	08:20.1
394135.5	4781070	20.95	-0.67	2	7	1.4	08:21.1
394135.7	4781070	21.2	-0.52	2	7	1.4	08:22.0
394135.6	4781071	21.5	-0.64	2	7	1.4	08:23.0
394135.4	4781071	21.4	-0.61	2	7	1.4	08:24.0
394135.2	4781071	21.1	-0.56	2	7	1.4	08:25.0
394135.1	4781072	20.9	-0.62	2	8	1.4	08:26.0
394135.2	4781072	21.8	-0.5	2	8	1.4	08:27.0
394135	4781073	22.73	-0.58	2	8	1.4	08:28.0
394134.9	4781073	23.2	-0.47	2	8	1.4	08:28.9
394134.9	4781074	23.3	-0.53	2	8	1.4	08:29.9
394134.9	4781075	23.3	-0.6	2	8	1.4	08:30.9
394135	4781075	22.35	-0.7	2	9	0.9	08:31.9
394134.8	4781076	21.73	-0.69	2	9	0.9	08:32.9
394134.6	4781076	21.5	-0.56	2	9	0.9	08:33.9
394134.5	4781077	21.3	-0.58	2	9	0.9	08:34.9
394134.6	4781077	20.5	-0.7	2	9	0.9	08:35.8
394134.6	4781078	20.33	-0.78	2	9	0.9	08:36.8
394134.7	4781078	20.5	-0.74	2	9	0.9	08:37.8
394134.8	4781079	20.3	-0.62	2	9	0.9	08:38.8
394134.6	4781079	20.3	-0.62	2	9	0.9	08:39.8
394134.5	4781079	19.8	-0.52	2	9	0.9	08:40.8
394134.6	4781080	19.73	-0.78	2	9	0.9	08:41.7
394134.6	4781080	19.8	-0.67	2	9	0.9	08:42.7
394134.6	4781081	19	-0.79	2	9	0.9	08:43.7
394134.7	4781081	18.43	-0.71	2	9	0.9	08:44.7
394134.8	4781082	17.8	-0.89	2	9	0.9	08:45.7
394135.1	4781082	17.9	-0.82	2	9	0.9	08:46.7
394135.5	4781083	18.2	-0.55	2	9	0.9	08:47.7
394135.7	4781083	18.4	-0.41	2	9	0.9	08:48.6
394136	4781084	18.2	-0.74	2	9	0.9	08:50.6
394136	4781084	18.35	-0.49	2	9	0.9	08:51.6
394135.9	4781084	18.65	-0.19	2	9	0.9	08:52.6
394136	4781084	16.9	-0.61	2	9	0.9	08:53.6

394135.9	4781085	15.63	-0.83	2	9	0.9	08:54.5
394135.9	4781086	15.1	-0.55	2	9	0.9	09:07.3
394136.3	4781086	15.3	-0.45	2	9	0.9	09:08.2
394136.7	4781087	15.6	-0.36	2	9	0.9	09:09.2
394137.3	4781087	15.5	-0.43	2	9	0.9	09:10.2
394137.9	4781087	15.1	-0.51	2	9	0.9	09:11.2
394138.4	4781087	15.3	-0.61	2	9	0.9	09:12.2
394138.7	4781087	15.7	-0.65	2	9	0.9	09:13.2
394139	4781087	15.7	-0.6	2	9	0.9	09:14.1
394139.1	4781088	15.7	-0.4	2	9	0.9	09:15.1
394139.4	4781088	15.8	-0.44	2	9	0.9	09:16.1
394139.4	4781088	15.8	-0.53	2	9	0.9	09:17.1
394139.5	4781088	15.6	-0.61	2	9	0.9	09:19.1
394139.4	4781088	15.4	-0.73	2	9	0.9	09:20.1
394139.3	4781089	15.6	-0.61	2	9	0.9	09:21.0
394139.4	4781089	15.33	-0.58	2	9	0.9	09:22.0
394139.3	4781090	15.1	-0.62	2	9	0.9	09:23.0
394139.2	4781090	15.6	-0.57	2	9	0.9	09:24.0
394139	4781091	15.7	-0.6	2	9	0.9	09:25.0
394138.8	4781091	15.6	-0.67	2	9	0.9	09:26.0
394138.6	4781091	16.1	-0.56	2	9	0.9	09:26.9
394138.7	4781092	16.8	-0.35	2	9	0.9	09:27.9
394138.5	4781093	18.2	0.07	2	9	0.9	09:28.9
394138.4	4781094	19.1	0.16	2	9	0.9	09:29.9
394138.6	4781094	17.2	-2.98	2	9	0.9	09:30.9
394138.6	4781095	14.7	-7.37	2	9	0.9	09:31.9
394138.7	4781095	13.1	-10.21	2	9	0.9	09:32.9
394138.8	4781096	13	-10.12	2	9	0.9	09:33.9
394138.8	4781096	14.4	-7.77	2	9	0.9	09:34.9
394138.8	4781097	13.5	-8.99	2	9	0.9	09:35.8
394138.6	4781097	15.15	-6.42	2	9	0.9	09:36.8
394138.4	4781098	17.75	-1.82	2	9	0.9	09:37.8
394138.1	4781098	19.4	0.73	2	9	0.9	09:38.8
394137.8	4781099	19.9	0.56	2	9	0.9	09:39.8
394137.6	4781099	19.95	0.05	2	9	0.9	09:40.8
394137.5	4781100	19	-0.26	2	9	0.9	09:41.8
394137.5	4781100	18.4	-0.42	2	9	0.9	09:42.8
394137.5	4781101	18.63	-0.37	2	9	0.9	09:43.7
394137.5	4781101	18.8	-0.35	2	9	0.9	09:44.7
394137.4	4781102	18.6	-0.36	2	9	0.9	09:45.7
394137.4	4781103	18.08	-0.41	2	9	0.9	09:46.7
394137.4	4781103	17.9	-0.35	2	9	0.9	09:47.7
394137.5	4781103	18.2	-0.21	2	9	0.9	09:48.7
394137.5	4781104	18.53	-0.1	2	9	0.9	09:49.6
394137.3	4781104	18.6	-0.15	2	9	0.9	09:50.6
394137.3	4781105	19	-0.19	2	9	0.9	09:51.6
394137.2	4781105	19.6	-0.1	2	9	0.9	09:52.6

394137	4781106	20.2	-0.24	2	9	0.9	09:53.6
394136.8	4781107	20.9	-0.28	2	9	0.9	09:54.6
394136.7	4781107	21.3	-0.43	2	9	0.9	09:55.5
394136.6	4781107	20.2	-0.42	2	9	0.9	09:56.5
394136.4	4781108	18.3	-0.49	2	9	0.9	09:57.5
394136.6	4781108	16.7	-0.41	2	8	1.1	09:59.5
394136.6	4781109	16	-0.37	2	9	0.9	10:00.5
394136.5	4781109	15.2	-0.29	2	9	0.9	10:01.5
394136.6	4781109	13.8	-0.42	2	9	0.9	10:02.4
394136.9	4781110	12.9	-0.48	2	9	0.9	10:03.4
394136.8	4781111	13.3	-0.15	2	9	0.9	10:04.4
394136.6	4781111	13.73	0.14	2	9	0.9	10:05.4
394136.4	4781112	13.58	-0.45	2	9	0.9	10:06.4
394136.1	4781112	14	-0.41	2	9	0.9	10:07.4
394135.6	4781113	14.7	-0.06	2	9	0.9	10:08.3
394135.7	4781113	15.3	0.02	2	9	0.9	10:09.3
394135.5	4781114	15.9	-0.08	2	9	0.9	10:10.3
394135.2	4781114	16	-0.6	2	9	0.9	10:11.3
394135.4	4781114	15.5	-0.69	2	9	0.9	10:12.3
394135.2	4781114	15.7	-0.08	2	9	0.9	10:13.3
394135.4	4781113	15.7	-0.23	2	9	0.9	10:14.3
394135.6	4781114	15.8	-0.49	2	10	0.9	10:59.7
394135.3	4781115	16	-0.44	2	10	0.9	11:00.7
394135.2	4781115	15.8	-0.16	2	10	0.9	11:01.7
394135.2	4781115	16.1	-0.08	2	10	0.9	11:02.7
394135.2	4781116	16.5	-0.31	2	10	0.9	11:03.6
394135.2	4781116	16.2	-0.52	2	10	0.9	11:04.6
394135.3	4781117	16	-0.3	2	10	0.9	11:05.6
394135.4	4781117	16	-0.46	2	10	0.9	11:06.6
394135.5	4781118	16.4	-0.34	2	10	0.9	11:07.6
394135.4	4781118	16.8	-0.3	2	10	0.9	11:08.6
394135.5	4781119	16.7	-0.6	2	9	0.9	11:09.5
394135.7	4781119	16.9	-0.7	2	10	0.9	11:11.5
394135.8	4781119	16.8	-0.5	2	10	0.9	11:12.5
394135.7	4781119	16.9	-0.66	2	10	0.9	11:16.4
394135.5	4781119	16.9	-0.68	2	10	0.9	11:17.4
394135.3	4781120	16.9	-0.72	2	10	0.9	11:18.4
394135.3	4781120	17.13	-0.57	2	10	0.9	11:19.4
394133.9	4781123	14.6	0.09	2	10	0.9	12:43.3
394133.9	4781122	14.6	0.12	2	10	0.9	12:44.3
394136	4781101	16.93	-0.57	2	10	0.9	13:44.3
394136.1	4781101	17.15	-0.49	2	10	0.9	13:45.3
394136.3	4781100	17.8	-0.35	2	10	0.9	13:46.3
394136.4	4781099	18.25	-0.26	2	10	0.9	13:47.2
394136.3	4781098	18.03	-0.22	2	10	0.9	13:48.2
394136.4	4781098	17.5	-0.32	2	10	0.9	13:49.2
394136.3	4781097	17.4	-0.39	2	10	0.9	13:50.2

394136.5	4781097	17.73	-0.19	2	10	0.9	13:51.2
394136.3	4781096	17.8	-0.16	2	10	0.9	13:52.2
394136.3	4781096	17.6	-0.28	2	10	0.9	13:53.2
394136.3	4781095	17.6	-0.49	2	10	0.9	13:54.1
394136.1	4781095	17.2	-0.5	2	10	0.9	13:55.1
394136.2	4781094	16.1	-0.9	2	10	0.9	13:56.1
394135.9	4781094	16.1	-0.52	2	10	0.9	13:57.1
394136.3	4781094	16.03	-0.35	2	10	0.9	13:58.1
394136.3	4781093	15.6	-0.56	2	10	0.9	13:59.1
394136.7	4781093	15.4	-0.82	2	10	0.9	14:00.0
394136.7	4781092	15.4	-0.77	2	10	0.9	14:01.0
394136.9	4781092	15.3	-0.93	2	10	0.9	14:02.0
394136.7	4781091	15.4	-0.96	2	10	0.9	14:03.0
394137	4781091	15.3	-1	2	10	0.9	14:04.0
394137	4781091	14.93	-0.88	2	10	0.9	14:05.0
394137.1	4781090	15.6	-0.65	2	10	0.9	14:06.0
394137.3	4781090	15.7	-0.53	2	10	0.9	14:06.9
394137.5	4781089	15.8	-0.64	2	10	0.9	14:07.9
394137.5	4781088	15.93	-0.79	2	10	0.9	14:08.9
394137.4	4781088	15.9	-0.61	2	10	0.9	14:09.9
394133.4	4781085	16.7	-0.71	2	10	0.9	14:27.7
394133.1	4781085	16.6	-0.63	2	10	0.9	14:28.7
394132.8	4781085	15.9	-1.01	2	10	0.9	14:29.7
394132.7	4781086	15.4	-0.83	2	10	0.9	14:30.7
394132.5	4781086	15.4	-0.65	2	10	0.9	14:31.7
394132.3	4781087	14.9	-1.11	2	10	0.9	14:32.7
394132	4781087	15	-0.74	2	10	0.9	14:33.7
394132	4781088	14.9	-0.6	2	10	0.9	14:34.6
394131.7	4781089	14.7	-0.97	2	10	0.9	14:35.6
394131.7	4781089	15.1	-0.68	2	10	0.9	14:36.6
394131.6	4781090	14.8	-0.88	2	10	0.9	14:37.6
394131.5	4781090	14.8	-0.88	2	9	0.9	14:38.6
394131.8	4781091	14.9	-0.72	2	9	0.9	14:39.6
394131.8	4781091	14.83	-0.76	2	9	0.9	14:40.5
394131.9	4781092	14.6	-0.75	2	10	0.9	14:41.5
394132.1	4781092	14.5	-0.77	2	10	0.9	14:42.5
394132.1	4781093	14.73	-0.76	2	10	0.9	14:43.5
394132.3	4781093	15	-0.73	2	10	0.9	14:44.5
394132.3	4781094	15.3	-0.75	2	10	0.9	14:45.5
394132.2	4781094	15.7	-0.61	2	10	0.9	14:46.5
394132.1	4781095	15.4	-0.73	2	10	0.9	14:47.4
394132.1	4781095	15.7	-0.67	2	10	0.9	14:48.4
394132.3	4781096	16	-0.66	2	10	0.9	14:49.4
394132.2	4781097	16.2	-0.62	2	10	0.9	14:50.4
394132.3	4781097	16.2	-0.64	2	10	0.9	14:51.4
394132.4	4781098	16.3	-0.66	2	10	0.9	14:52.4
394132.4	4781098	16.9	-0.57	2	10	0.9	14:53.3

394132.8	4781099	17	-0.52	2	10	0.9	14:54.3
394132.8	4781099	16.5	-0.57	2	10	0.9	14:55.3
394132.7	4781099	16.1	-0.65	2	10	0.9	14:56.3
394132.7	4781100	15.9	-0.64	2	10	0.9	14:57.3
394132.7	4781100	15.63	-0.66	2	10	0.9	14:58.3
394132.9	4781101	15.7	-0.53	2	10	0.9	14:59.3
394133	4781101	15.9	-0.61	2	10	0.9	15:00.2
394133.1	4781102	16.3	-0.59	2	10	0.9	15:01.2
394133.1	4781102	16.5	-0.49	2	10	0.9	15:02.2
394133.3	4781103	16.7	-0.67	2	10	0.9	15:03.2
394133.2	4781103	17.1	-0.65	2	10	0.9	15:04.2
394133.2	4781104	17.53	-0.48	2	10	0.9	15:05.2
394133.1	4781104	18.2	-0.48	2	10	0.9	15:06.1
394132.8	4781105	19.2	-0.61	2	10	0.9	15:07.1
394132.5	4781105	20.4	-0.38	2	10	0.9	15:08.1
394132	4781106	21.4	-0.37	2	10	0.9	15:09.1
394131.6	4781106	21.9	-0.36	2	10	0.9	15:10.1
394131.3	4781107	20.4	-0.55	2	10	0.9	15:11.1
394131.4	4781107	18.95	-0.63	2	10	0.9	15:12.1
394131.2	4781108	17.1	-0.66	2	10	0.9	15:13.0
394131.3	4781108	15.5	-0.84	2	10	0.9	15:14.0
394131.4	4781108	14.6	-0.5	2	10	0.9	15:15.0
394131.3	4781109	13.73	-0.57	2	10	0.9	15:16.0
394131.5	4781109	13.3	-0.45	2	9	0.9	15:17.0
394131.4	4781110	13.5	-0.32	2	10	0.9	15:18.0
394131.4	4781110	13.1	-0.49	2	10	0.9	15:18.9
394131.4	4781110	13.1	-0.47	2	10	0.9	15:19.9
394131.3	4781111	13.5	-0.26	2	10	0.9	15:20.9
394131.2	4781111	14.1	-0.11	2	10	0.9	15:23.9
394131	4781112	14.2	-0.13	2	10	0.9	15:24.8
394131.1	4781112	14.2	-0.05	2	10	0.9	15:25.8
394130.6	4781113	14.1	-0.09	2	10	0.9	15:26.8
394130.9	4781113	14.4	-0.23	2	10	0.9	15:27.8
394130.8	4781114	14.7	0.02	2	10	0.9	15:28.8
394130.8	4781114	15.2	0.2	2	10	0.9	15:29.8
394131.2	4781115	15.5	-0.09	2	10	0.9	15:30.8
394131.2	4781115	15.9	0.06	2	10	0.9	15:31.7
394131.5	4781116	16.1	-0.01	2	10	0.9	15:32.7
394131.6	4781116	16.1	-0.05	2	10	0.9	15:33.7
394132.2	4781117	15.5	-0.13	2	10	0.9	15:34.7
394132.2	4781117	14.8	-0.22	2	10	0.9	15:35.7
394132.3	4781118	14.2	-0.3	2	10	0.9	15:36.7
394132.3	4781118	14	-0.15	2	10	0.9	15:37.6
394132.4	4781119	14.4	0.16	2	10	0.9	15:38.6
394132.6	4781119	14.8	0.37	2	10	0.9	15:39.6
394132.6	4781120	14.7	0.11	2	10	0.9	15:40.6
394132.8	4781120	14.8	0.18	2	10	0.9	15:41.6

394132.8	4781121	14.5	0.07	2	10	0.9	15:42.6
394132.9	4781121	14.5	0.2	2	10	0.9	15:43.6
394132.7	4781122	14.5	0.21	2	10	0.9	15:44.6
394132.7	4781122	14.6	0.19	2	10	0.9	15:45.5
394132.8	4781122	14.23	0.05	2	10	0.9	15:46.5
394133.2	4781124	14.93	0.05	2	10	0.9	15:51.2
394133.8	4781124	15.83	0.02	2	10	0.9	15:52.2
394134.4	4781124	16.4	-0.12	2	10	0.9	15:53.2
394135.3	4781124	16.4	-0.08	2	10	0.9	15:54.1
394135.6	4781123	16.2	-0.14	2	10	0.9	15:55.1
394136.2	4781123	16	-0.01	2	9	0.9	15:57.1
394136.1	4781122	16.4	0.01	2	10	0.9	15:58.1
394135.7	4781122	16.4	-0.35	2	10	0.9	15:59.1
394135.7	4781122	17.2	-0.38	2	10	0.9	16:00.0
394135.4	4781121	17.2	-0.49	2	10	0.9	16:01.0
394135.8	4781121	16.7	-0.53	2	10	0.9	16:03.0
394136.1	4781121	16.6	-0.59	2	10	0.9	16:05.0
394136.4	4781121	16.8	-0.68	2	10	0.9	16:10.9
394135.9	4781120	16.03	-0.2	2	10	0.9	16:13.8
394136	4781120	16.9	-0.49	2	10	0.9	16:15.8
394136.4	4781120	17.03	-0.48	2	10	0.9	16:16.8
394136.6	4781119	17	-0.5	2	10	0.9	16:17.8
394136.5	4781119	17.4	-0.28	2	10	0.9	16:18.8
394136.8	4781119	17.7	-0.11	2	10	0.9	16:19.7
394136.8	4781119	17.3	-0.18	2	10	0.9	16:20.7
394137.2	4781119	16.93	-0.38	2	10	0.9	16:21.7
394137.3	4781118	16.6	-0.31	2	10	0.9	16:22.7
394137.7	4781117	16.5	-0.29	2	10	0.9	16:23.7
394137.9	4781117	16.73	-0.13	2	10	0.9	16:24.7
394138.3	4781117	16.4	-0.36	2	10	0.9	16:25.6
394138.8	4781116	16.7	-0.3	2	10	0.9	16:26.6
394139.1	4781116	17.1	-0.04	2	10	0.9	16:27.6
394139.3	4781115	17.1	-0.11	2	10	0.9	16:28.6
394139.5	4781115	16.4	-0.41	2	10	0.9	16:29.6
394139.5	4781115	16.2	-0.3	2	10	0.9	16:30.6
394129.8	4781121	13.3	-0.68	2	10	0.9	17:46.3
394129.8	4781121	13.43	-0.64	2	10	0.9	17:47.3
394130	4781121	13.63	-0.31	2	10	0.9	17:48.3
394129.7	4781120	13.6	-0.37	2	10	0.9	17:49.3
394129.6	4781120	14.4	0	2	10	0.9	17:50.3
394129.6	4781119	14.7	0.25	2	10	0.9	17:51.2
394129.7	4781118	14.4	-0.04	2	10	0.9	17:52.2
394129.8	4781118	14.7	0.14	2	10	0.9	17:53.2
394130	4781117	14.5	0.2	2	10	0.9	17:54.2
394130	4781117	13.8	0.09	2	10	0.9	17:55.2
394130	4781116	13.2	0.09	2	10	0.9	17:56.2
394130.2	4781116	13.2	-0.45	2	10	0.9	17:58.1

394130.2	4781115	12.15	-0.53	2	10	0.9	18:01.1
394130.3	4781115	12.38	-0.43	2	10	0.9	18:02.1
394130.1	4781114	12.48	-0.27	2	10	0.9	18:03.1
394130.1	4781114	12.4	-0.36	2	10	0.9	18:04.0
394130.3	4781114	12.4	-0.5	2	10	0.9	18:05.0
394130	4781116	12.9	-0.11	2	9	0.9	18:23.9
394130	4781115	12.63	-0.18	2	10	0.9	18:24.9
394130.2	4781115	12.5	-0.18	2	10	0.9	18:25.9
394130.3	4781114	12.5	-0.24	2	10	0.9	18:26.8
394130.3	4781114	12.5	-0.37	2	10	0.9	18:27.8
394130.4	4781113	12.4	-0.35	2	10	0.9	18:28.8
394130.2	4781113	12.3	-0.33	2	10	0.9	18:29.8
394130.2	4781112	12.58	-0.43	2	10	0.9	18:30.8
394130.2	4781112	13.1	-0.64	2	10	0.9	18:31.8
394130.2	4781112	13.68	-0.57	2	10	0.9	18:32.7
394130.2	4781112	14.2	-0.3	2	10	0.9	18:33.7
394130.2	4781111	14.9	-0.38	2	10	0.9	18:34.7
394130	4781103	15.83	-0.33	2	9	0.9	19:15.8
394129.9	4781103	16	-0.23	2	9	0.9	19:16.8
394130.1	4781103	15.8	0.14	2	9	0.9	19:17.7
394130.3	4781104	13.7	-1.75	2	10	0.9	19:19.7
394132.5	4781094	14.8	-0.61	2	10	0.9	19:57.1
394132.4	4781093	14.8	-0.7	2	10	0.9	19:59.1
394132.3	4781093	14.8	-0.77	2	10	0.9	20:00.1
394132.3	4781093	14.7	-0.78	2	10	0.9	20:01.1
394132.2	4781092	14.9	-0.74	2	10	0.9	20:02.1
394132.2	4781092	15	-0.68	2	10	0.9	20:03.0
394132	4781091	15.2	-0.69	2	10	0.9	20:04.0
394132.1	4781091	15.4	-0.68	2	10	0.9	20:05.0
394132.1	4781090	15.4	-0.62	2	10	0.9	20:06.0
394132.1	4781090	15.53	-0.56	2	10	0.9	20:07.0
394132.2	4781089	15.5	-0.56	2	10	0.9	20:08.0
394132.3	4781089	15.5	-0.58	2	10	0.9	20:09.0
394132.6	4781088	15.8	-0.6	2	10	0.9	20:09.9
394132.5	4781087	15.9	-0.67	2	10	0.9	20:10.9
394132.4	4781087	15.8	-0.54	2	10	0.9	20:11.9
394132.3	4781086	15.8	-0.53	2	10	0.9	20:12.9
394132.2	4781086	16	-0.61	2	10	0.9	20:13.9
394132.3	4781086	16	-0.8	2	9	0.9	20:16.8
394132.2	4781085	15.9	-0.83	2	10	0.9	20:17.8
394132.2	4781085	16.1	-0.7	2	10	0.9	20:18.8
394132.1	4781085	16.3	-0.66	2	10	0.9	20:19.8
394132.1	4781084	16.33	-0.83	2	10	0.9	20:20.8
394131.9	4781084	16.6	-0.72	2	10	0.9	20:21.7
394132.1	4781083	16.9	-0.62	2	10	0.9	20:22.7
394132	4781083	16.8	-0.72	2	10	0.9	20:23.7
394132	4781082	17	-0.68	2	10	0.9	20:24.7

394131.7	4781082	17.13	-0.69	2	10	0.9	20:25.7
394131.7	4781081	17.33	-0.63	2	10	0.9	20:26.7
394131.6	4781081	17.6	-0.59	2	9	0.9	20:27.7
394131.4	4781081	17.6	-0.68	2	9	0.9	20:28.6
394131.1	4781081	18.2	-0.66	2	10	0.9	20:29.6
394131.2	4781080	18.3	-0.69	2	10	0.9	20:30.6
394131.3	4781080	18.1	-0.7	2	10	0.9	20:31.6
394131.2	4781080	18	-0.76	2	10	0.9	20:32.6
394131.1	4781079	18.6	-0.75	2	10	0.9	20:33.6
394131.1	4781078	19	-0.79	2	10	0.9	20:34.5
394131.4	4781078	19.35	-0.68	2	10	0.9	20:35.5
394131	4781077	19.4	-0.61	2	10	0.9	20:36.5
394130.9	4781077	19.2	-0.69	2	10	0.9	20:37.5
394130.9	4781076	19.2	-0.73	2	10	0.9	20:38.5
394130.8	4781076	19.2	-0.8	2	10	0.9	20:39.5
394130.8	4781076	19.8	-0.63	2	10	0.9	20:40.4
394130.7	4781075	19.7	-0.83	2	10	0.9	20:42.4
394130.5	4781074	20.1	-0.75	2	10	0.9	20:47.3
394130.9	4781074	20.9	-0.61	2	10	0.9	20:48.3
394130.8	4781073	20.55	-0.68	2	10	0.9	20:49.3
394130.7	4781073	20.5	-0.67	2	10	0.9	20:50.3
394130.7	4781072	20.1	-0.77	2	10	0.9	20:52.3
394130.8	4781072	20.4	-0.65	2	10	0.9	20:53.3
394130.7	4781071	20.65	-0.61	2	10	0.9	20:54.2
394130.7	4781070	20.78	-0.59	2	10	0.9	20:55.2
394130.9	4781070	20.5	-0.7	2	10	0.9	20:56.2
394131	4781069	20.2	-0.68	2	10	0.9	20:57.2
394130.8	4781068	20.6	-0.67	2	10	0.9	20:58.2
394131	4781067	20.85	-0.63	2	10	0.9	20:59.2
394131.3	4781067	20.9	-0.64	2	10	0.9	21:00.1
394131.5	4781066	21.1	-0.54	2	10	0.9	21:01.1
394131.6	4781065	20.88	-0.56	2	10	0.9	21:02.1
394131.9	4781065	20.5	-0.67	2	10	0.9	21:03.1
394132	4781064	19.9	-0.6	2	10	0.9	21:04.1
394132.1	4781064	19.33	-0.49	2	10	0.9	21:05.1
394132.1	4781063	18.3	-0.6	2	10	0.9	21:06.1
394129.9	4781065	20.3	-0.66	2	10	0.9	22:23.0
394130	4781065	20.4	-0.63	2	9	0.9	22:24.0
394129.8	4781066	20.5	-0.63	2	10	0.9	22:25.0
394129.7	4781066	20.5	-0.61	2	10	0.9	22:25.9
394129.6	4781067	20.4	-0.72	2	9	1.2	22:26.9
394129.3	4781067	20.5	-0.68	2	9	1.2	22:27.9
394129	4781068	20.7	-0.61	2	9	1.2	22:28.9
394128.7	4781068	20.4	-0.69	2	9	1.2	22:29.9
394128.3	4781069	19.9	-0.8	2	9	1.2	22:30.9
394128.1	4781069	20.2	-0.76	2	10	0.9	22:31.9
394127.8	4781069	20.5	-0.7	2	10	0.9	22:32.8

394127.7	4781070	20.7	-0.66	2	10	0.9	22:33.8
394127.6	4781070	20.8	-0.72	2	10	0.9	22:36.8
394127.4	4781070	20.9	-0.72	2	10	0.9	22:37.8
394127.2	4781071	20.7	-0.74	2	10	0.9	22:38.7
394127.1	4781071	20.4	-0.78	2	10	0.9	22:39.7
394127.1	4781071	20.1	-0.9	2	10	0.9	22:40.7
394127	4781071	20.03	-0.88	2	10	0.9	22:41.7
394126.6	4781072	19.8	-0.73	2	10	0.9	22:42.7
394126.4	4781072	19.55	-0.64	2	10	0.9	22:43.7
394126.2	4781072	19.3	-0.63	2	10	0.9	22:44.7
394126.2	4781073	19	-0.54	2	10	0.9	22:45.6
394126.4	4781073	19.03	-0.71	2	10	0.9	22:46.6
394126.4	4781073	18.9	-0.61	2	9	0.9	22:47.6
394126.2	4781074	18.1	-1.24	2	10	0.9	22:49.6
394126.2	4781074	18.53	-0.89	2	10	0.9	22:50.6
394126.2	4781074	18.6	-0.8	2	10	0.9	22:51.6
394126.1	4781075	18.3	-0.82	2	10	0.9	22:52.5
394125.9	4781075	18.4	-0.83	2	10	0.9	22:53.5
394126	4781076	17.8	-1.31	2	10	0.9	22:54.5
394125.9	4781076	17.6	-1.42	2	10	0.9	22:55.5
394125.9	4781076	17.5	-1.69	2	10	0.9	22:56.5
394125.6	4781077	18.1	-1.38	2	10	0.9	22:57.5
394125.6	4781078	18.3	-0.82	2	10	0.9	22:58.4
394125.6	4781078	18	-0.71	2	10	0.9	22:59.4
394125.5	4781078	17.7	-0.82	2	10	0.9	23:00.4
394125.6	4781079	17.2	-0.78	2	10	0.9	23:01.4
394125.6	4781079	17.03	-0.74	2	10	0.9	23:02.4
394125.8	4781080	16.8	-0.84	2	10	0.9	23:03.4
394125.7	4781080	16.8	-0.84	2	10	0.9	23:04.4
394125.9	4781081	16.8	-0.71	2	10	0.9	23:05.3
394125.8	4781081	16.9	-0.55	2	10	0.9	23:06.3
394126	4781082	16.4	-0.65	2	10	0.9	23:07.3
394126.2	4781082	16.1	-0.89	2	10	0.9	23:08.3
394126	4781083	16.45	-0.62	2	10	0.9	23:09.3
394126.1	4781083	16.5	-0.5	2	10	0.9	23:10.3
394126	4781084	15.6	-0.74	2	10	0.9	23:11.3
394126.1	4781084	15.1	-0.87	2	10	0.9	23:12.2
394126	4781085	15.1	-0.75	2	10	0.9	23:13.2
394125.7	4781085	15	-0.56	2	10	0.9	23:14.2
394125.5	4781086	14.33	-0.85	2	10	0.9	23:16.2
394125.3	4781086	14.25	-0.76	2	10	0.9	23:17.2
394125.1	4781087	14.2	-0.75	2	10	0.9	23:18.1
394125.1	4781087	13.7	-0.7	2	10	0.9	23:20.1
394124.4	4781088	13.6	-0.78	2	10	0.9	23:21.1
394124.2	4781088	13.7	-0.64	2	9	0.9	23:22.1
394123.9	4781089	13.45	-0.82	2	9	0.9	23:23.1
394123.4	4781089	13.4	-0.73	2	9	0.9	23:24.1

394123.2	4781090	13.6	-0.53	2	9	0.9	23:25.0
394123.1	4781091	13.8	-0.75	2	9	0.9	23:26.0
394123	4781092	13.9	-0.74	2	9	0.9	23:27.0
394122.9	4781092	14	-0.55	2	9	0.9	23:28.0
394123.1	4781093	13.6	-0.74	2	9	0.9	23:29.0
394123.1	4781094	13.5	-0.71	2	9	0.9	23:30.0
394123.1	4781095	14	-0.53	2	9	0.9	23:30.9
394123.2	4781095	14	-0.47	2	9	0.9	23:31.9
394123.6	4781096	14.1	-0.32	2	9	0.9	23:32.9
394123.7	4781097	14.7	-0.44	2	9	0.9	23:33.9
394123.5	4781097	14.3	-0.66	2	9	0.9	23:34.9
394123.3	4781098	13.3	-0.96	2	9	0.9	23:35.9
394123.1	4781098	12.9	-1.08	2	9	0.9	23:36.9
394122.8	4781099	13.3	-0.82	2	9	0.9	23:37.8
394122.4	4781100	13.5	-0.61	2	9	0.9	23:38.8
394122.2	4781100	13.7	-0.61	2	9	0.9	23:39.8
394122	4781101	13.48	-0.7	2	9	0.9	23:40.8
394121.9	4781102	13.5	-0.65	2	9	0.9	23:41.8
394121.8	4781102	13.5	-0.6	2	9	0.9	23:42.8
394121.8	4781103	13.5	-0.45	2	9	0.9	23:43.7
394121.9	4781104	13.78	-0.49	2	9	0.9	23:44.7
394121.9	4781104	14.43	-0.54	2	9	0.9	23:45.7
394122.1	4781105	15.28	-0.52	2	9	0.9	23:46.7
394122.1	4781106	15.3	-0.55	2	9	0.9	23:47.7
394122	4781107	15.5	-0.48	2	9	0.9	23:48.7
394122	4781108	16.1	-0.1	2	9	0.9	23:49.7
394122.1	4781108	16.1	-0.04	2	9	0.9	23:50.6
394122.1	4781109	16	-0.55	2	9	0.9	23:51.6
394122.1	4781110	16.3	-0.74	2	9	0.9	23:52.6
394122.2	4781111	16.4	-0.64	2	9	0.9	23:53.6
394122.2	4781111	16.5	-0.6	2	9	0.9	23:54.6
394122.3	4781112	16.53	-0.78	2	9	0.9	23:55.6
394122.2	4781112	16.9	-0.9	2	9	0.9	23:56.6
394121.9	4781113	16.9	-0.92	2	9	0.9	23:57.5
394121.8	4781114	16.5	-0.92	2	8	1.2	23:58.5
394121.6	4781115	16.18	-0.83	2	8	1.2	23:59.5
394121.3	4781115	15.7	-0.93	2	8	1.2	24:00.5
394121	4781116	15.6	-1	2	8	1.2	24:01.5
394120.9	4781117	15.9	-0.96	2	8	1.2	24:02.5
394120.8	4781117	16.3	-0.96	2	8	1.2	24:03.4
394120.9	4781118	16.8	-0.91	2	8	1.2	24:04.4
394120.8	4781118	17.1	-1.08	2	8	1.2	24:05.4
394120.7	4781119	17	-1.13	2	8	1.2	24:06.4
394120.6	4781120	16.6	-1.05	2	8	1.2	24:07.4
394120.6	4781121	16.4	-0.81	2	8	1.2	24:08.4
394125.7	4781124	12.2	-0.41	2	9	0.9	24:34.7
394125.8	4781124	12.3	-0.41	2	9	0.9	24:35.6

394125.9	4781124	12.5	-0.42	2	9	0.9	24:36.6
394126	4781123	12.93	-0.4	2	10	0.9	24:37.6
394125.9	4781123	13.7	-0.26	2	10	0.9	24:38.6
394125.9	4781122	14.1	0.02	2	10	0.9	24:39.6
394126.1	4781122	13.5	-0.15	2	10	0.9	24:40.6
394126.1	4781122	13.3	-0.14	2	10	0.9	24:41.6
394126.2	4781121	13.8	0.63	2	10	0.9	24:42.5
394126.2	4781121	13.8	1.4	2	10	0.9	24:43.5
394126.4	4781120	12.8	1.44	2	10	0.9	24:44.5
394126.3	4781120	11.7	1.8	2	10	0.9	24:45.5
394126.3	4781119	10.8	2.02	2	10	0.9	24:46.5
394126.5	4781119	10.3	1.7	2	9	0.9	24:48.5
394126.8	4781118	10.4	1.85	2	9	0.9	24:49.4
394127	4781118	11.73	1.63	2	9	0.9	24:50.4
394127.4	4781117	14	1.03	2	9	0.9	24:51.4
394127.4	4781116	15.2	-0.04	2	9	0.9	24:52.4
394127.6	4781116	14.8	-1.04	2	9	0.9	24:53.4
394127.7	4781115	14.83	-0.76	2	9	0.9	24:54.4
394127.5	4781115	14.7	-0.54	2	10	0.9	24:55.4
394127.4	4781115	15	-0.59	2	10	0.9	24:56.3
394127.3	4781115	15.8	-0.5	2	10	0.9	24:57.3
394127	4781114	16.5	-0.61	2	10	0.9	24:58.3
394127	4781114	17.1	-0.68	2	10	0.9	24:59.3
394126.7	4781114	17.7	-0.82	2	10	0.9	25:00.3
394126.3	4781113	18.6	-0.67	2	10	0.9	25:01.3
394125.9	4781113	18.9	-0.56	2	10	0.9	25:02.3
394125.6	4781112	17.85	-0.68	2	10	0.9	25:03.3
394125.4	4781112	16.98	-0.85	2	10	0.9	25:04.2
394125.3	4781111	17.1	-0.59	2	10	0.9	25:05.2
394125.5	4781111	17.03	-0.68	2	10	0.9	25:07.2
394125.4	4781111	17	-0.59	2	10	0.9	25:08.2
394125.4	4781110	16.8	-0.53	2	10	0.9	25:09.2
394125.4	4781110	16.5	-0.56	2	10	0.9	25:10.1
394125.6	4781110	16.4	-0.38	2	10	0.9	25:11.1
394125.8	4781110	16.5	-0.67	2	10	0.9	25:13.1
394125.6	4781109	16.1	-0.64	2	10	0.9	25:15.1
394125.2	4781109	15.8	-0.61	2	10	0.9	25:16.0
394125.4	4781109	15.5	-0.71	2	10	0.9	25:17.0
394125.5	4781109	15.53	-0.7	2	10	0.9	25:18.0
394125.9	4781109	16	-0.53	2	10	0.9	25:19.0
394126.2	4781108	16.2	-0.47	2	10	0.9	25:20.0
394126.9	4781108	15.8	-0.54	2	10	0.9	25:21.0
394127	4781107	15.6	-0.57	2	10	0.9	25:22.0
394127.1	4781107	15.4	-0.46	2	10	0.9	25:22.9
394127.4	4781106	14.8	-0.41	2	10	0.9	25:23.9
394127.4	4781106	14.3	-0.61	2	10	0.9	25:24.9
394127.7	4781105	14.1	-0.64	2	10	0.9	25:25.9

394127.7	4781105	13.9	-0.5	2	10	0.9	25:26.9
394128	4781105	13.93	-0.41	2	10	0.9	25:27.9
394128.1	4781104	13.9	-0.47	2	10	0.9	25:28.8
394128.3	4781104	14.3	-0.5	2	10	0.9	25:29.8
394128.1	4781103	14.2	-0.64	2	10	0.9	25:30.8
394128.2	4781103	14.2	-0.64	2	10	0.9	25:31.8
394128	4781102	14.2	-0.62	2	10	0.9	25:32.8
394128.2	4781102	14.4	-0.7	2	10	0.9	25:33.8
394128.3	4781101	14.6	-0.61	2	10	0.9	25:34.8
394128.3	4781101	14.9	-0.47	2	10	0.9	25:35.7
394128.3	4781100	15.3	-0.38	2	10	0.9	25:36.7
394128.4	4781099	15.4	-0.33	2	10	0.9	25:37.7
394128.3	4781098	15.03	-0.48	2	10	0.9	25:38.7
394128.3	4781098	14.3	-0.67	2	10	0.9	25:39.7
394128.4	4781097	14.1	-0.7	2	10	0.9	25:40.7
394128.5	4781097	14	-0.59	2	10	0.9	25:41.6
394128.7	4781096	14.1	-0.59	2	10	0.9	25:42.6
394128.9	4781096	14.1	-0.66	2	10	0.9	25:43.6
394128.9	4781095	14.2	-0.69	2	10	0.9	25:44.6
394129	4781095	14.3	-0.67	2	10	0.9	25:45.6
394129.1	4781094	14.4	-0.62	2	10	0.9	25:46.6
394129.3	4781094	14.4	-0.69	2	10	0.9	25:47.5
394129.5	4781093	14.4	-0.75	2	10	0.9	25:48.5
394129.9	4781093	14.3	-0.68	2	10	0.9	25:49.5
394130	4781092	14.53	-0.58	2	10	0.9	25:50.5
394129.9	4781092	14.5	-0.54	2	10	0.9	25:51.5
394129.8	4781092	14.43	-0.64	2	10	0.9	25:52.5
394129.8	4781091	14.3	-0.77	2	9	0.9	25:53.5
394129.6	4781090	14.4	-0.45	2	9	0.9	25:54.4
394129.5	4781090	14.4	-0.74	2	10	0.9	25:55.4
394129.5	4781089	14.6	-0.72	2	10	0.9	25:56.4
394129.4	4781089	14.9	-0.72	2	10	0.9	25:57.4
394129.5	4781088	15.2	-0.53	2	10	0.9	25:58.4
394129.4	4781088	15.4	-0.61	2	10	0.9	25:59.4
394129.6	4781087	15.6	-0.7	2	10	0.9	26:00.3
394129.8	4781087	15.9	-0.62	2	10	0.9	26:01.3
394129.9	4781087	15.83	-0.9	2	10	0.9	26:03.3
394130.3	4781087	16.2	-0.75	2	9	0.9	26:04.3
394130.7	4781086	16.43	-0.63	2	9	0.9	26:05.3
394131.1	4781085	16.5	-0.64	2	9	0.9	26:06.3
394131.6	4781085	16.6	-0.65	2	9	0.9	26:07.2

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APPENDIX F
Calibration Logs

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Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/7/21	**Time of Calibration:**	5:45	
Weather Conditions:	Cloudy, high of 30			
Barometric Pressure:	30.25	(inches Hg) x 25.4 =	768.35	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	48804

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	7.64 — —	7.00 — —	7.00 — —	
Water TEMP (°C)	19.60	—	—	
Specific Conductance (mS/cm)				
Turbidity (NTU)	-0.8 —	0.0 —	0.0 —	
DO (mg/L)				go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	—	—	—	Not calibrated
Notes:	The horiba U-52 is calibrated sing a single solution for pH, conductivity, turbidity, and DO			

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	40134

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.0	100.0	100.0	
Notes:				

Multi-Gas Meter

Instrument Name/Model:	GEM 2000	**Serial Number:**	16275

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
CH_4 (%)	30.0	30.0	30.0	
CO_2 (%)	50.0	50.0	50.0	
H2S (%)	2.5	2.5	2.5	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/8/21	**Time of Calibration:**	6:00	
Weather Conditions:	Cloudy, high of 30			
Barometric Pressure:	30.25	(inches Hg) x 25.4 =	768.35	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	48804

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	6.89 — —	7.00 — —	7.00 — —	
Water TEMP (°C)	19.80	—	—	
Specific Conductance (mS/cm)				
Turbidity (NTU)	-2.1 —	0.0 —	0.0 —	
DO (mg/L)				go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	—	—	—	Not calibrated
Notes:	The horiba U-52 is calibrated sing a single solution for pH, conductivity, turbidity, and DO			

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	40134

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	99.9	100.0	100.0	
Notes:				

Multi-Gas Meter

Instrument Name/Model:	GEM 2000	**Serial Number:**	16275

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
CH_4 (%)	31.2	30.0	30.0	
CO_2 (%)	49.8	50.0	50.0	
H2S (%)	2.3	2.5	2.5	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/11/21	**Time of Calibration:**	6:00	
Weather Conditions:	Cloudy, high of 37			
Barometric Pressure:	30	(inches Hg) x 25.4 =	762.00	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	48804	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	7.08 — —	7.00 — —	7.00 — —	
Water TEMP (°C)	19.50	—	—	
Specific Conductance (mS/cm)				
Turbidity (NTU)	3.4 —	0.0 —	0.0 —	
DO (mg/L)				go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	—	—	—	Not calibrated
Notes:	The horiba U-52 is calibrated sing a single solution for pH, conductivity, turbidity, and DO			

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	40134	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.1	100.0	100.0	
Notes:				

Multi-Gas Meter

Instrument Name/Model:	GEM 2000	**Serial Number:**	16275	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
CH_4 (%)	32.0	30.0	30.0	
CO_2 (%)	50.8	50.0	50.0	
H2S (%)	2.6	2.5	2.5	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/12/21	**Time of Calibration:**	6:00	
Weather Conditions:	Cloudy, high of 34			
Barometric Pressure:	29.98	(inches Hg) x 25.4 =	761.49	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	48804	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	7.11 — —	7.00 — —	7.00 — —	
Water TEMP (°C)	19.70	—	—	
Specific Conductance (mS/cm)				
Turbidity (NTU)	1.6 —	0.0 —	0.0 —	
DO (mg/L)				go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	—	—	—	Not calibrated
Notes:	The horiba U-52 is calibrated sing a single solution for pH, conductivity, turbidity, and DO			

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	40134	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.0	100.0	100.0	
Notes:				

Multi-Gas Meter

Instrument Name/Model:	GEM 2000	**Serial Number:**	16275	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
CH_4 (%)	31.8	30.0	30.0	
CO_2 (%)	49.8	50.0	50.0	
H2S (%)	2.6	2.5	2.5	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/13/21	**Time of Calibration:**	6:00	
Weather Conditions:	Cloudy, high of 38			
Barometric Pressure:	30.02	(inches Hg) x 25.4 =	762.51	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	48804	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	7.23 — —	7.00 — —	7.00 — —	
Water TEMP (°C)	19.80	—	—	
Specific Conductance (mS/cm)				
Turbidity (NTU)	2.5 —	0.0 —	0.0 —	
DO (mg/L)	—	—	—	go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	—	—	—	Not calibrated
Notes:	The horiba U-52 is calibrated sing a single solution for pH, conductivity, turbidity, and DO			

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	40134	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.1	100.0	100.0	
Notes:				

Multi-Gas Meter

Instrument Name/Model:	GEM 2000	**Serial Number:**	16275	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
CH_4 (%)	30.7	30.0	30.0	
CO_2 (%)	55.2	50.0	50.0	
H2S (%)	2.5	2.5	2.5	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/14/21	**Time of Calibration:**	6:00	
Weather Conditions:	Cloudy, high of 38			
Barometric Pressure:	30.001	(inches Hg) x 25.4 =	762.03	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	48804	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	7.11 — —	7.00 — —	7.00 — —	
Water TEMP (°C)	19.80	—	—	
Specific Conductance (mS/cm)				
Turbidity (NTU)	6.8 —	0.0 —	0.0 —	
DO (mg/L)	—	—	—	go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	—	—	—	Not calibrated
Notes:	The horiba U-52 is calibrated sing a single solution for pH, conductivity, turbidity, and DO			

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	40134	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	99.9	100.0	100.0	
Notes:				

Multi-Gas Meter

Instrument Name/Model:	GEM 2000	**Serial Number:**	16275	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
CH_4 (%)	31.2	30.0	30.0	
CO_2 (%)	51.0	50.0	50.0	
H2S (%)	2.4	2.5	2.5	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/25/21	**Time of Calibration:**	6:30	
Weather Conditions:	Partly Cloudy, high of 30			
Barometric Pressure:	30.01	(inches Hg) x 25.4 =	762.25	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.0	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/26/21	**Time of Calibration:**	6:30	
Weather Conditions:	Cloudy with snow in afternoon, high of 30			
Barometric Pressure:	30	(inches Hg) x 25.4 =	762.00	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	99.9	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/27/21	**Time of Calibration:**	6:30	
Weather Conditions:	Cloudy, high of 26			
Barometric Pressure:	30.02	(inches Hg) x 25.4 =	762.51	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.0	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/28/21	**Time of Calibration:**	6:30	
Weather Conditions:	Cloudy, high of18			
Barometric Pressure:	30	(inches Hg) x 25.4 =	762.00	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.0	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	1/29/21	**Time of Calibration:**	6:30	
Weather Conditions:	Snow, high of16			
Barometric Pressure:	30.01	(inches Hg) x 25.4 =	762.25	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.2	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	2/1/21	**Time of Calibration:**	6:30	
Weather Conditions:	Snow, high of 30			
Barometric Pressure:	30.03	(inches Hg) x 25.4 =	762.76	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	21150	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	4.20 -- --	4.01 -- --	7.01 -- --	
Water TEMP (°C)	19.80	--	--	
Specific Conductance (mS/cm)	0.411	0.401	0.401	
Turbidity (1.0 NTU)	2.3 --	1.0 --	1.0 --	
DO (mg/L)	9.87	--	9.92	go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	241.3	--	244.4	

Notes:

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	20614	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	99.8	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	2/2/21	**Time of Calibration:**	6:30	
Weather Conditions:	Snow, high of 30			
Barometric Pressure:	29.99	(inches Hg) x 25.4 =	761.75	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.1	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	2/3/21	**Time of Calibration:**	6:30	
Weather Conditions:	Snow, high of 31			
Barometric Pressure:	30	(inches Hg) x 25.4 =	762.00	mm Hg

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000		**Serial Number:**	20614

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.1	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	2/4/21	**Time of Calibration:**	6:30	
Weather Conditions:	Cloudy, high of 36			
Barometric Pressure:	30	(inches Hg) x 25.4 =	762.00	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	21150	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	4.19 -- --	4.01 -- --	7.01 -- --	
Water TEMP (°C)	14.58	--	--	
Specific Conductance (mS/cm)	0.339	0.401	0.401	
Turbidity (1.0 NTU)	1.3 --	1.0 --	1.0 --	
DO (mg/L)	10.01	--	9.99	go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	240.8	--	241.5	

Notes:

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	20614	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	99.8	100.0	100.0	
Notes:				

Daily Instrument Calibration Sheet

Project Name:	Former New York Ordnance Works			
Calibrating Personnel:	SG			
Date of Calibration:	2/5/21	**Time of Calibration:**	6:30	
Weather Conditions:	Cloudy, high of 40			
Barometric Pressure:	29.98	(inches Hg) x 25.4 =	761.49	mm Hg

Groundwater Field Parameter Probe

Instrument Name/Model:	Horiba U-52	**Serial Number:**	21150	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
pH	4.21 -- --	4.01 -- --	4.01 -- --	
Water TEMP (°C)	19.20	--	--	
Specific Conductance (mS/cm)	0.338	0.401	0.401	
Turbidity (1.0 NTU)	0.9 --	1.0 --	1.0 --	
DO (mg/L)	9.82	--	10.00	go here for value entered: https://water.usgs.gov/software/DOTABLES/
ORP (mV)	245.3	--	247.3	

Notes:

Photoionization Detector

Instrument Name/Model:	MiniRAE 3000	**Serial Number:**	20614	

Parameter	Initial Reading	Value Entered	Calibrated Reading	Comment
Isobutylene (ppm)	100.0	100.0	100.0	

Notes:

APPENDIX G

Soil Boring and Temporary Monitoring Well Installation Logs

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Note:

1. Descriptors (e.g., plasticity) apply only to the fine-grained fraction of the soil.

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SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-001
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Western Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168123.174, E 890594.327		**Surface Elevation:** 423.249 ft AMSL
Start Date: 2/4/2021	**End Date:** 2/4/2021	**Casing Elevation:** 426.059 ft AMSL
Depth to Groundwater: 8 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 12 ft bgs
Depth to Water and Elapse Time After Drilling: 3.98 ft btoc on 2/5/21 at 0810		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 7 to 17 ft bgs; 2.7 ft Stick-up		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
0	425	0.0-1.5 Sandy organic soil with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	10 / 30 / 60	7.5YR 3/2	OL			0.0	NYOW-04-SL001-A	Top of Casing 2.7 ft; Ground Surface
1		1.5-3.0 Silt with trace gravel and sand; maximum grain size 7 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R1		0.0		Water level 1.28 ft bgs on 2/5/21 at 0810; 1" PVC

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.98 ft btoc = 1.28 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-001

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3	420	3.0-3.5 Silt with trace gravel and sand; maximum grain size 8 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	5 / 10 / 85					0.0	NYOW-04-PH001-B	Bentonite Seal
4		3.5-4.0 Silt with trace gravel and sand; maximum grain size 7 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
5		4.0-6.5 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 4/3	ML			0.0		
6						R2		0.0		
7		6.5-8.0 Silt with trace gravel and sand; maximum grain size 10 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	5 / 10 / 85					0.0	NYOW-04-PH001-C	
8	415	8.0-9.0 Silty sand with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 70 / 20		SM			0.0		Wet at 8 to 9 ft bgs
9		9.0-12.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
10			10 / 30 / 60		ML	R3		0.0		
11										Filter Pack

Grain Size Legend

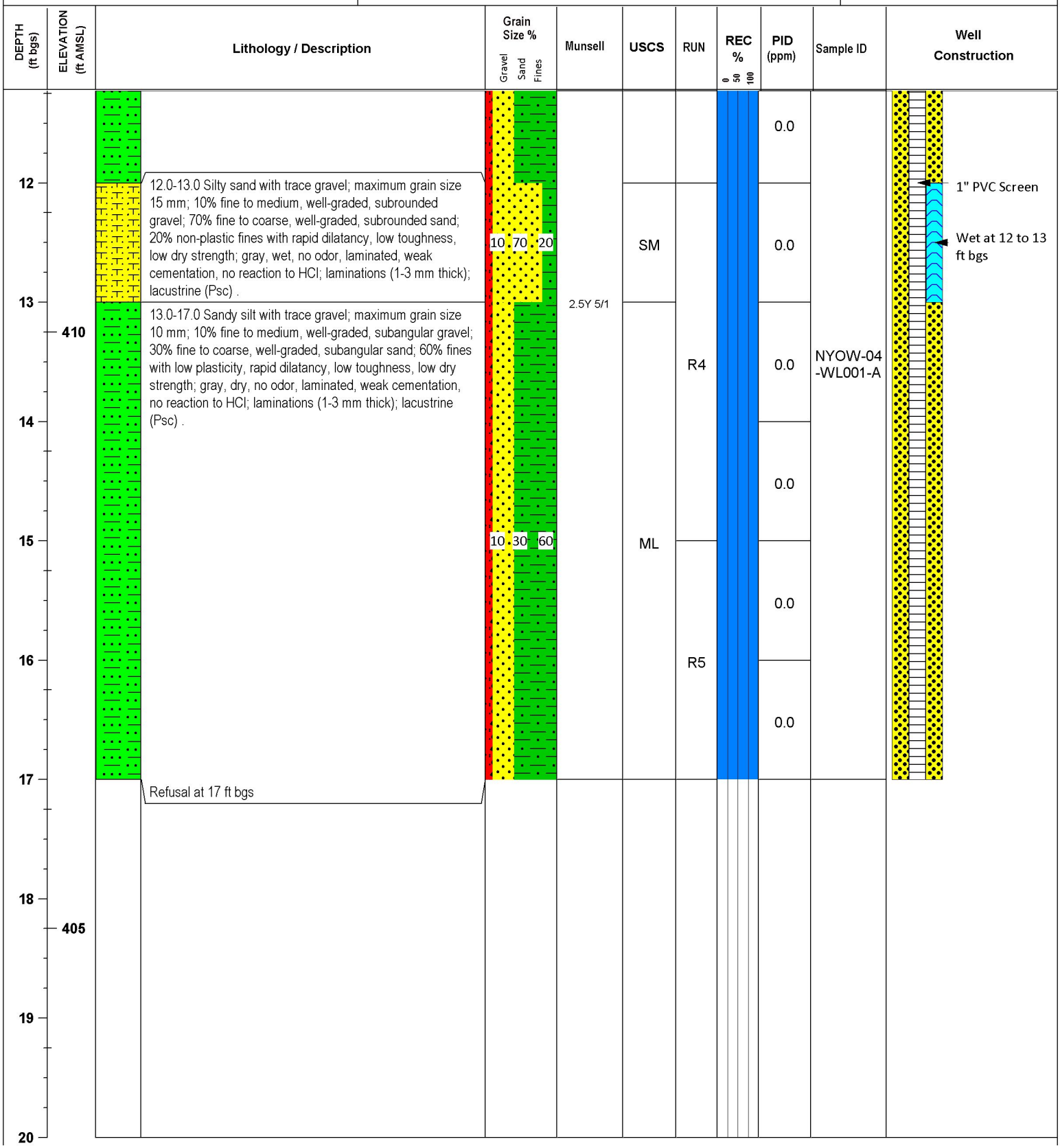
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.98 ft btoc = 1.28 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-001

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

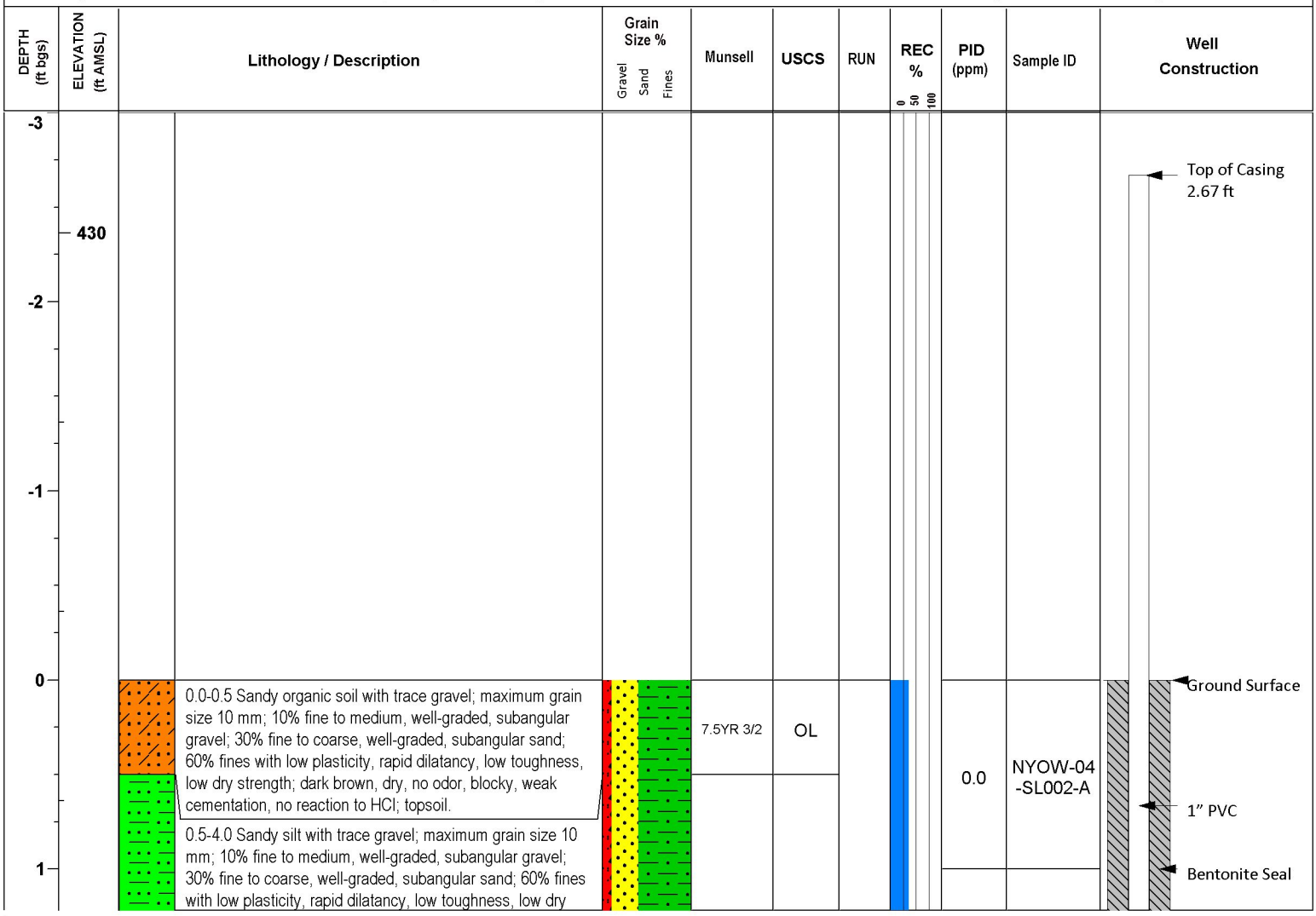
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.98 ft btoc = 1.28 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-002
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Western Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167762.792, E 890904.806		**Surface Elevation:** 427.637 ft AMSL
Start Date: 1/28/2021	**End Date:** 1/28/2021	**Casing Elevation:** 430.527 ft AMSL
Depth to Groundwater: 8 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 12 ft bgs
Depth to Water and Elapse Time After Drilling: 6.37 ft btoc on 2/5/21 at 0835		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 4 to 12 ft bgs; 2.67 ft Stick-up		



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 6.37 ft btoc = 3.7 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-002

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
2	425	strength; light brown, moist, no odor, laminated, weak cementation, no reaction to HCl; wet at 4.5 ft bgs; lacustrine (Psc) .	10 / 30 / 60		ML	R1		0.0 0.0 0.0	NYOW-04 -PH002-B	Water level 3.7 ft bgs on 2/5/21 at 0835
4		4.0-8.0 Silty sand with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; light brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 6/4	SM	R2		0.0 0.0 0.0 0.0	NYOW-04 -PH002-C	Wet at 4 ft bgs Filter Pack
8	420	8.0-10.0 Silty sand with trace gravel; maximum grain size 10	10 / 70 / 20							1" PVC Screen

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 6.37 ft btoc = 3.7 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-002

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 50 100)	PID (ppm)	Sample ID	Well Construction
9		mm; 10% fine, poorly-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; light brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		Wet at 8 to 10 ft bgs
								0.0		
10		10.0-10.5 Silty sand with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; light brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .			SM	R3				
								0.0		
11		10.5-11.5 Silty sand with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 4/3					NYOW-04 -WL002-A	
								0.0		
12		11.5-12.0 Silty sand with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; light brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) . Refusal at 12 ft bgs		7.5YR 6/4						
	415									
13										
14										
15										

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 6.37 ft btoc = 3.7 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

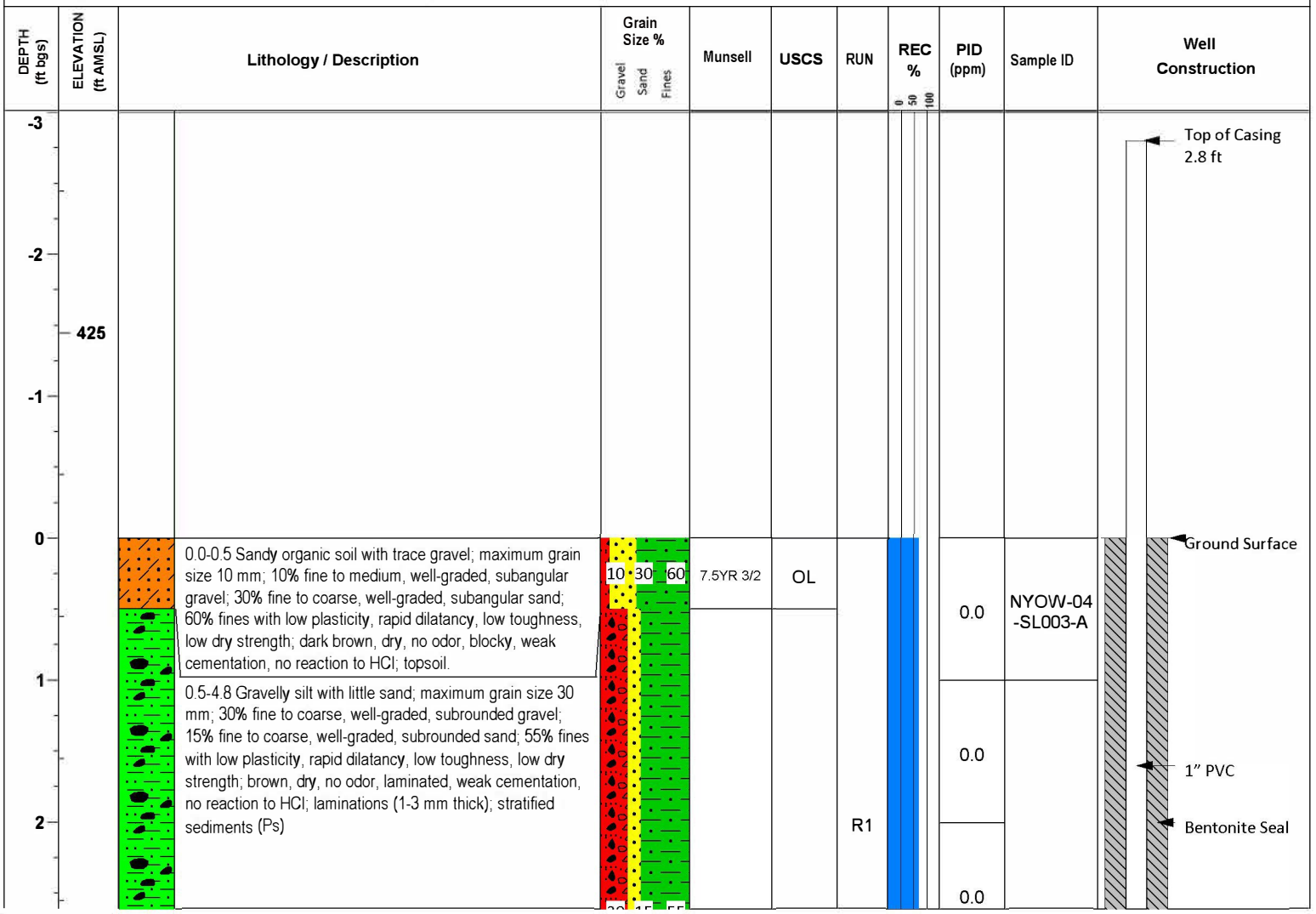
Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-003
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Western Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167435.801, E 891187.796		**Surface Elevation:** 423.554 ft AMSL
Start Date: 2/4/2021	**End Date:** 2/4/2021	**Casing Elevation:** 426.574 ft AMSL

Depth to Groundwater: 5 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 16 ft bgs

Depth to Water and Elapse Time After Drilling: 5.67 ft btoc on 2/5/21 at 0825

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 6 to 16 ft bgs; 2.8 ft Stick-up



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.67 ft btoc = 2.87 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-003

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3			30 / 15 / 55		ML				NYOW-04-PH003-B	Water level 2.87 ft bgs on 2/5/21 at 0825
	420			7.5YR 4/3				0.0		
4		4.8-5.0 Silt with trace gravel and sand; maximum grain size 10 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
5		5.0-6.0 Elastic silt with trace gravel and sand; maximum grain size 12 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	5 / 10 / 85		MH			0.0		Wet at 5 to 6 ft bgs
6		6.0-7.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R2		0.0		
7		7.0-11.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0	NYOW-04-PH003-C	
8								0.0		
	415									
9						R3		0.0		
10			10 / 30 / 60		ML					Filter Pack
								0.0		
11		11.0-12.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		2.5Y 5/1				0.0		1" PVC Screen / Wet at 11 to 12 ft bgs

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.67 ft btoc = 2.87 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-003

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
12										
13	410	12.0-14.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R4		0.0 0.0	NYOW-04-WL003-A	
14		14.0-16.0 Silty sand with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 70 / 20		SM	R5		0.0 0.0		Wet at 14 to 16 ft bgs
15										
16		Refusal at 16 ft bgs								
17										
18										
19	405									
20										
21										

Grain Size Legend

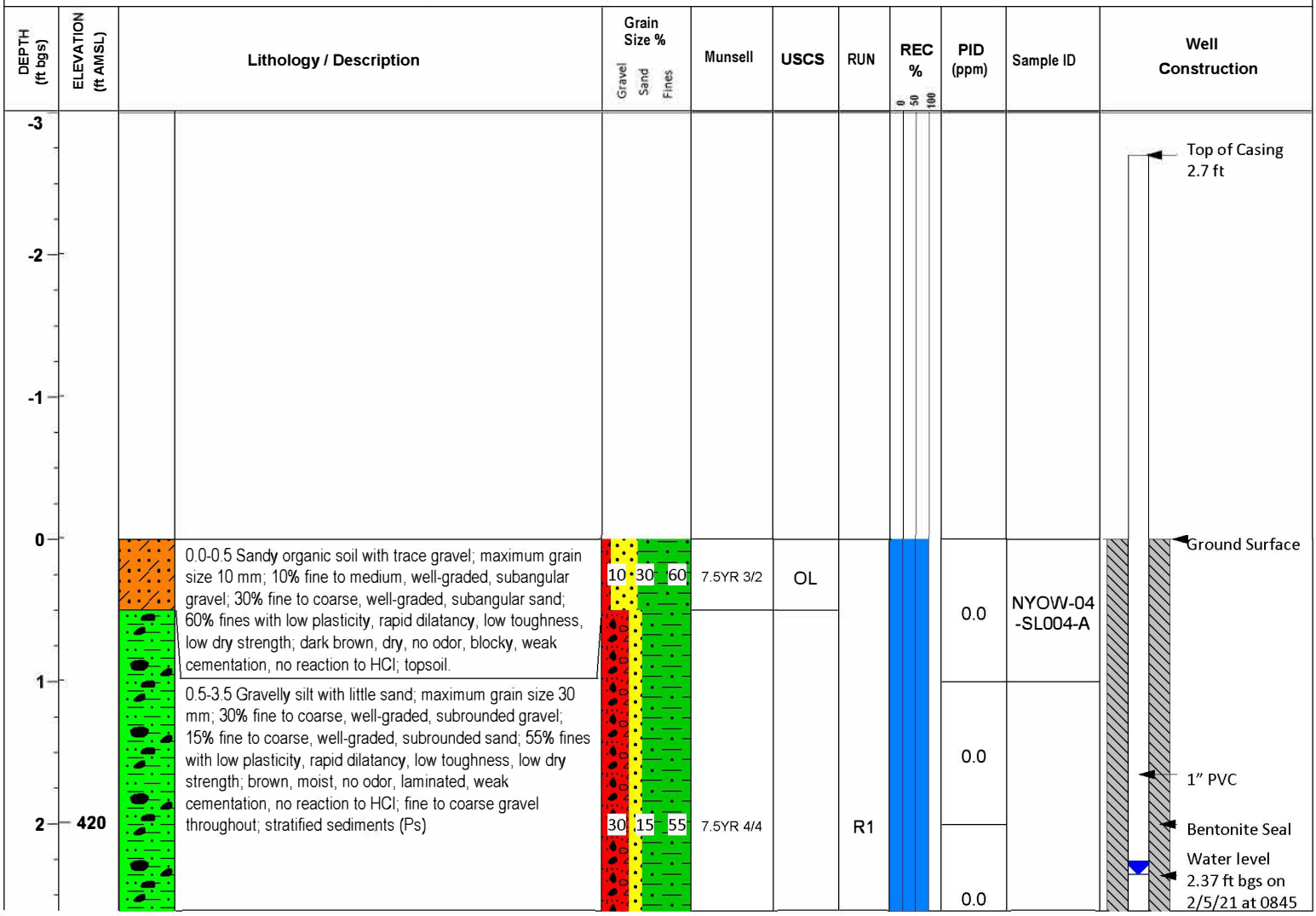
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.67 ft btoc = 2.87 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-004
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Western Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166672.385, E 891844.225		**Surface Elevation:** 421.991 ft AMSL
Start Date: 1/29/2021	**End Date:** 1/29/2021	**Casing Elevation:** 424.581 ft AMSL
Depth to Groundwater: 8 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 16 ft bgs
Depth to Water and Elapse Time After Drilling: 5.07 ft btoc on 2/5/21 at 0845		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 6 to 16 ft bgs; 2.7 ft Stick-up		



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.07 ft btoc = 2.37 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-004

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3									NYOW-04-PH004-B	
								0.0		
4		3.5-6.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; moist at 4 ft bgs; lacustrine (Psc) .						0.0		
5								0.0		
6		6.0-8.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .			ML	R2		0.0		
7	415			7.5YR 4/3				0.0	NYOW-04-PH004-C	
			10 · 30 — 60							
8		8.0-11.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
9								0.0		
10						R3		0.0		Wet at 8 to 11.5 ft bgs Filter Pack
11								0.0		1" PVC Screen
		11.5-12.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel;								Wet at 11.5 to

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.07 ft btoc = 2.37 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-004

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 50 100)	PID (ppm)	Sample ID	Well Construction
12	410	30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		12 ft bgs
13		12.0-16.0 Silty sand with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0	NYOW-04-WL004-A	
14			10 70 20	2.5Y 5/1	SM	R4		0.0		Wet at 12 to 16 ft bgs
15								0.0		
16		Refusal at 16 ft bgs								
17	405									
18										
19										
20										
21										

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.07 ft btoc = 2.37 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-005
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Western Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166301.327, E 892170.998		**Surface Elevation:** 419.573 ft AMSL
Start Date: 1/29/2021	**End Date:** 1/29/2021	**Casing Elevation:** 422.373 ft AMSL
Depth to Groundwater: 8 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 17 ft bgs
Depth to Water and Elapse Time After Drilling: 5.61 ft btoc on 2/5/21 at 0850		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 7 to 17 ft bgs; 2.7 ft Stick-up		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 / 50 / 100)	PID (ppm)	Sample ID	Well Construction
-3										Top of Casing 2.7 ft
-2										
-1										
420										
0		0.0-1.0 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	NYOW-04 -SL005-A	Ground Surface
1		1.0-3.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 4/3		R1		0.0		
2								0.0		1" PVC
										Bentonite Seal

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.61 ft btoc = 2.91 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-005

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 50 100)	PID (ppm)	Sample ID	Well Construction
3		3.0-4.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; strong brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 4/6				0.0	NYOW-04-PH005-B	Water level 2.91 ft bgs on 2/5/21 at 0850
4		4.0-8.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
5	415							0.0		
6				7.5YR 4/3		R2		0.0		
7								0.0		
8		8.0-10.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; strong brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 30 60		ML			0.0	NYOW-04-PH005-C	
9				7.5YR 5/6				0.0		Wet at 8 to 10 ft bgs
10	410	10.0-16.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R3		0.0		
11								0.0		Filter Pack

Grain Size Legend

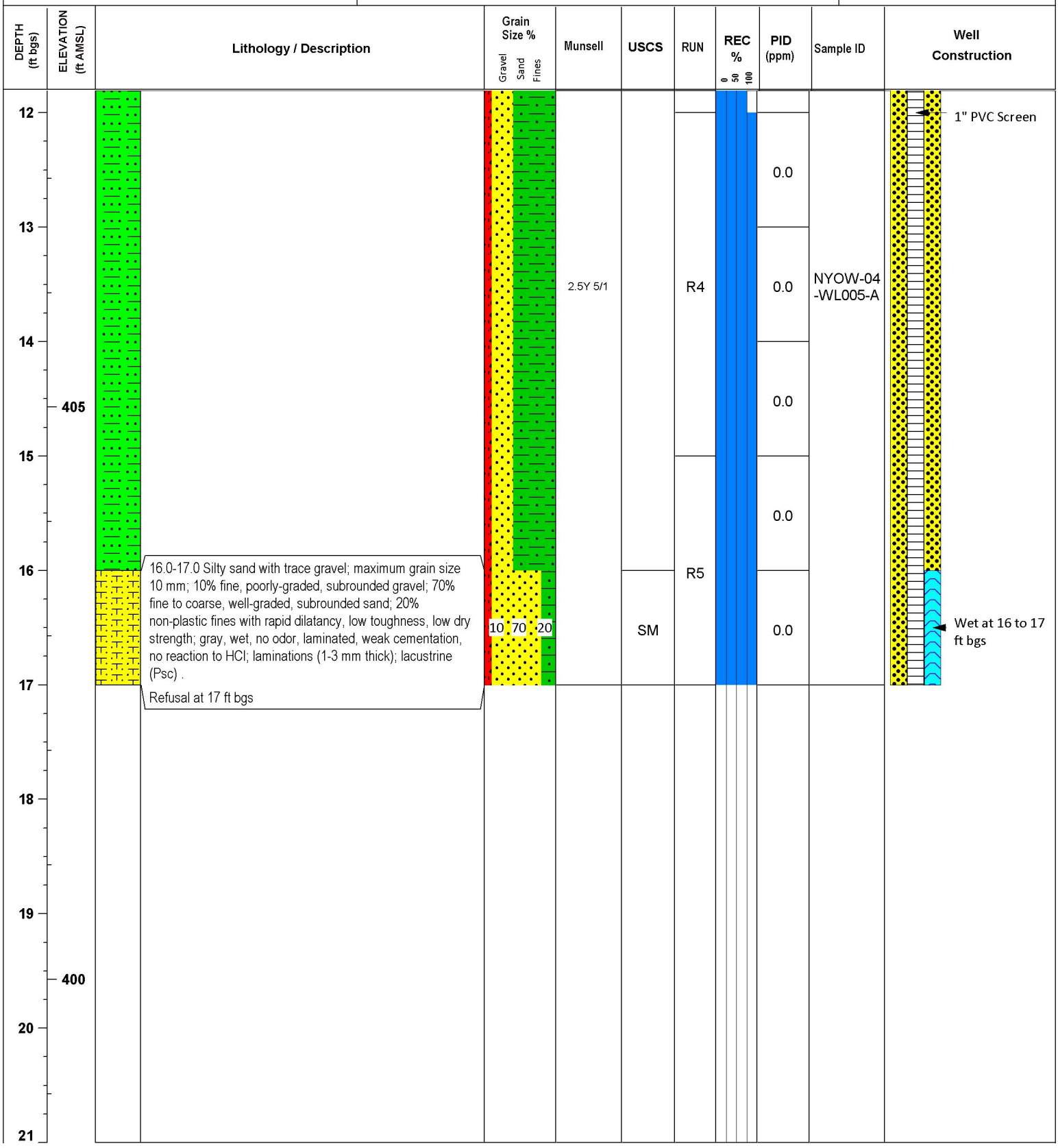
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.61 ft btoc = 2.91 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-005

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.61 ft btoc = 2.91 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-006
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21

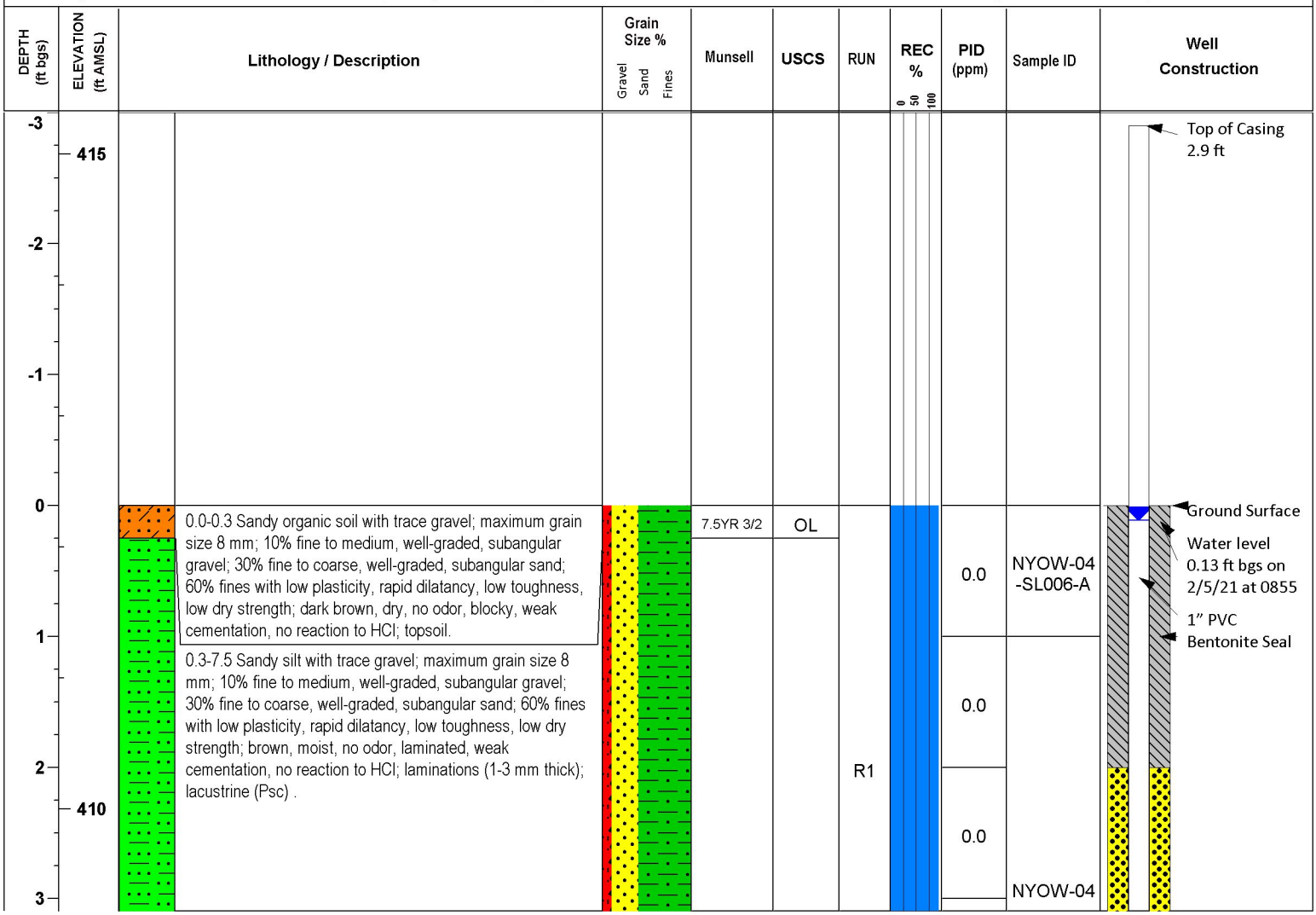
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Western Transect	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1165790.332, E 892810.295	**Surface Elevation:** 412.316 ft AMSL
Start Date: 2/3/2021 **End Date:** 2/3/2021	**Casing Elevation:** 415.216 ft AMSL

Depth to Groundwater: 8 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 12 ft bgs

Depth to Water and Elapse Time After Drilling: 3.03 ft btoc on 2/5/21 at 0855

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 4 to 12 ft bgs; 2.9 ft Stick-up



Grain Size Legend

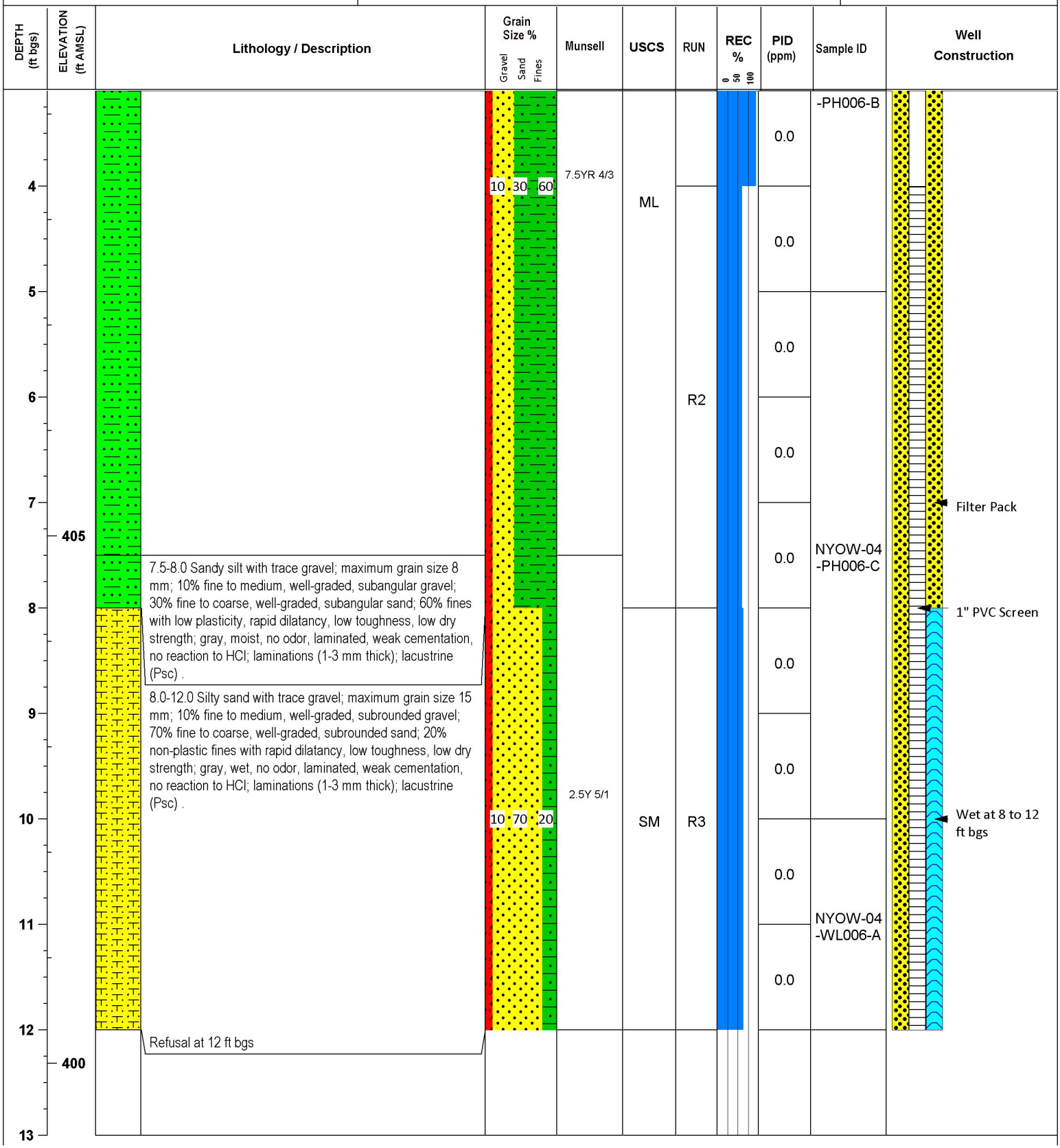
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.03 ft btoc = 0.13 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-006

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.03 ft btoc = 0.13 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-007
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168549.869, E 890437.481	**Surface Elevation:** 427 ft AMSL
Start Date: 1/25/2021 **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel at 2.5 ft bgs; lacustrine (Psc) .						0.0		
2	425		10 / 30 / 60	7.5YR 5/3	ML	R1	79	0.0		
3								0.0	NYOW-04-PH007-B	
4								0.0		
5		End boring at 5 ft bgs						0.0		
6										
7	420									

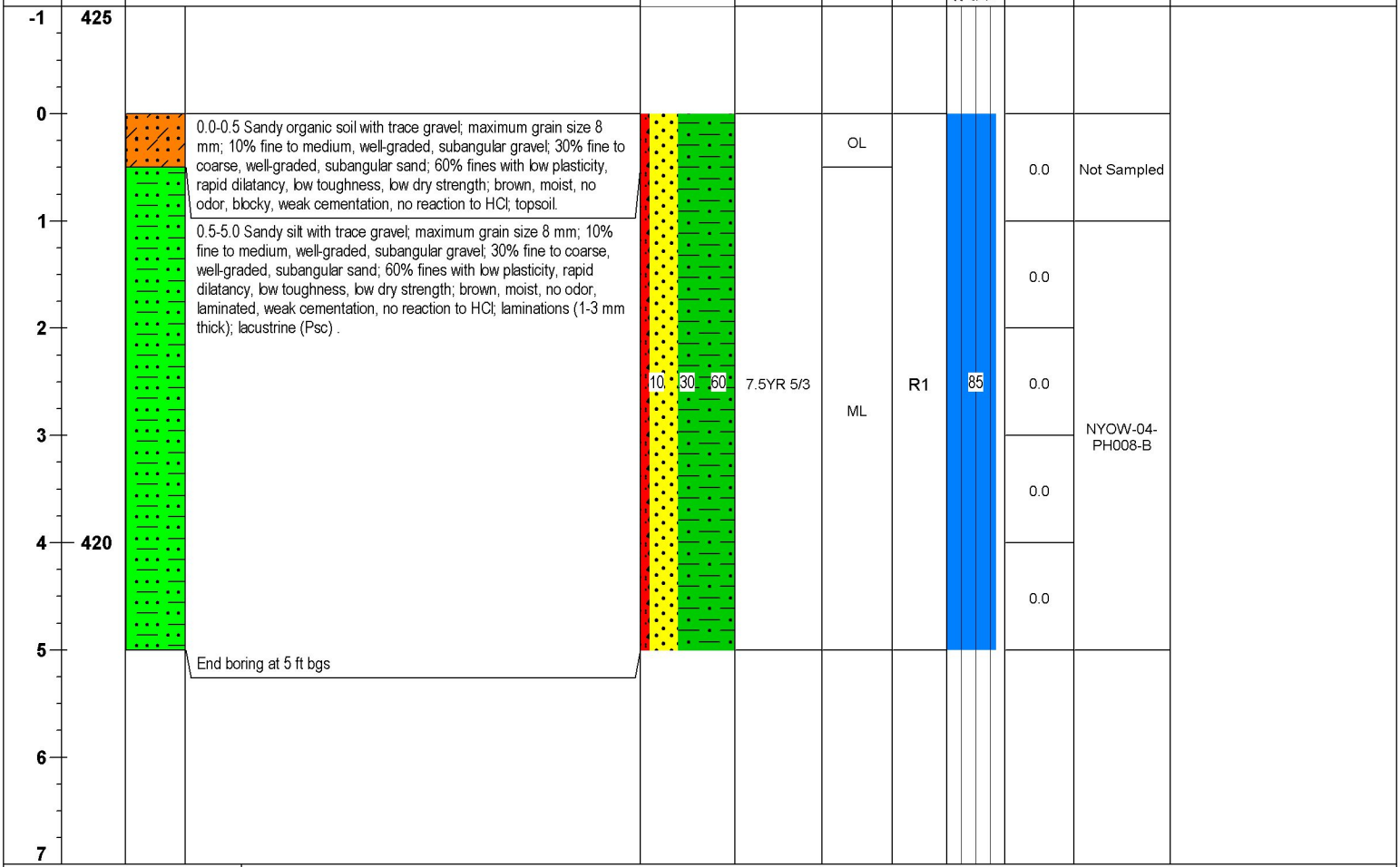
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-008
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168434.951, E 890540.075	**Surface Elevation:** 424 ft AMSL
Start Date: 1/25/2021 — **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-009
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168322.838, E 890633.35	**Surface Elevation:** 423 ft AMSL
Start Date: 1/25/2021 **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.3-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2			10 / 30 / 60	7.5YR 5/3	ML	R1	88	0.0	NYOW-04-PH009-B	
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-010
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168224.065, E 890668.297	**Surface Elevation:** 425 ft AMSL
Start Date: 2/4/2021 — **End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	425	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL			0.0	Not Sampled	
1		0.3-4.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 4/3	ML	R1	95	0.0	NYOW-04-PH010-B	
2								0.0		
3								0.0		
4								0.0		
5	420	4.5-5.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	30 / 15 / 55							
6		End boring at 5 ft bgs								
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-011
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168211.072, E 890682.432	**Surface Elevation:** 424 ft AMSL
Start Date: 2/4/2021 — **End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	425	0.0-0.3 Sandy organic soil with trace gravel, maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	10 / 30 / 60	7.5YR 3/2	OL	R1	50	0.0	Not Sampled	
1		0.3-5.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)						0.0		
2								0.0		
3			30 / 15 / 55	7.5YR 4/3	ML			0.0	NYOW-04-PH011-B	
4	420							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-012
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168178.937, E 890755.454		**Surface Elevation:** 423 ft AMSL
Start Date: 1/25/2021	**End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.3-4.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2				7.5YR 5/3				0.0		
3			10 / 30 / 60		ML	R1	95	0.0	NYOW-04-PH012-B	
4								0.0		
5		4.5-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 5/1				0.0		
6		End boring at 5 ft bgs								
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-013
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168063.843, E 890853.099		**Surface Elevation:** 424 ft AMSL
Start Date: 1/25/2021	**End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft / **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	425	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-4.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2 ft bgs; lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML	R1	100	0.0	NYOW-04-PH013-B	
2								0.0		
3								0.0		
4	420							0.0		
5		4.5-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 5/1						
6		End boring at 5 ft bgs								
7										

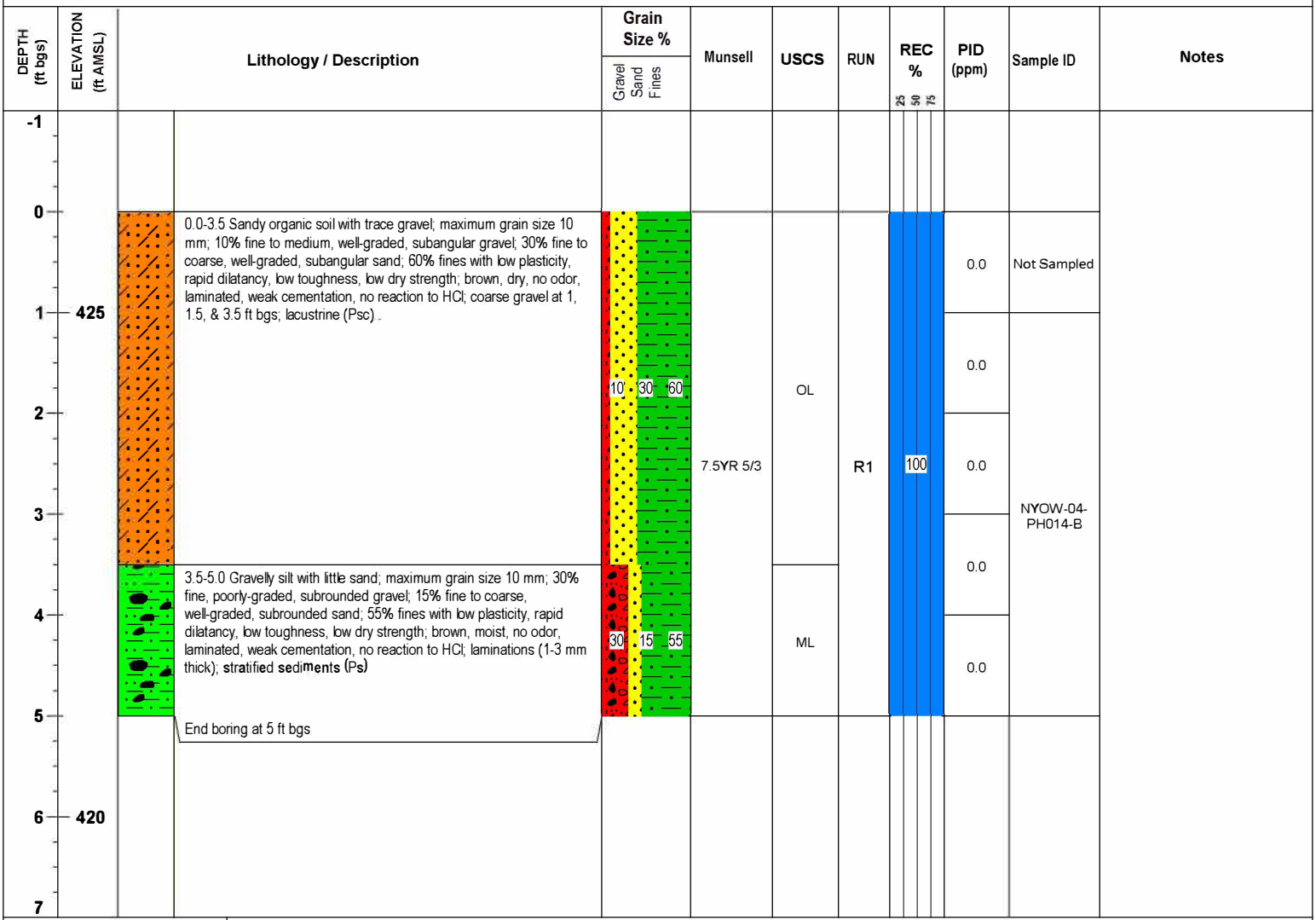
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-014
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167925.849, E 890964.223	**Surface Elevation:** 426 ft AMSL
Start Date: 1/25/2021 — **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



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Gravel — Fines

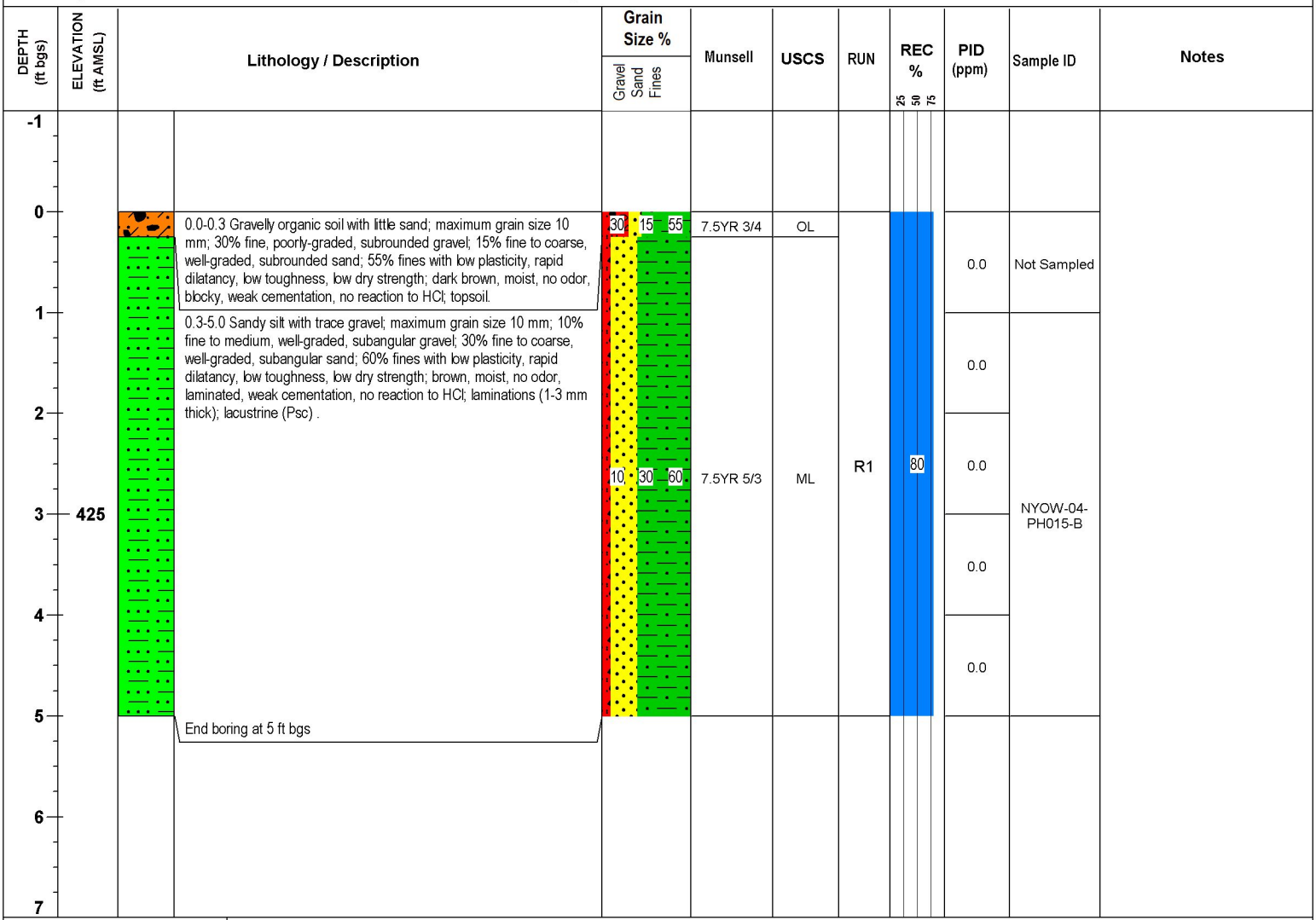
Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-015
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167862.836, E 890976.832	**Surface Elevation:** 428 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



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Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-016
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167843.576, E 890992.849	**Surface Elevation:** 430 ft AMSL
Start Date: 1/27/2021 **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	430	0.0-0.5 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 3/4	OL	R1	100	0.0	Not Sampled	
1		0.5-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2								0.0		
3			10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH016-B	
4								0.0		
5	425	End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-017

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1167796.672, E 891075.177 | **Surface Elevation:** 425 ft AMSL

Start Date: 1/25/2021 | **End Date:** 1/25/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	425	0.0-1.0 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 5/3	OL	R1	100	0.0	Not Sampled	
1		1.0-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60		ML			0.0	NYOW-04-PH017-B	
2								0.0		
3								0.0		
4								0.0		
5	420	End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-018
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167702.546, E 891156.303	**Surface Elevation:** 424 ft AMSL
Start Date: 1/25/2021 — **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	425	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; moist at 1 ft bgs; lacustrine (Psc)	10 / 30 / 60	7.5YR 5/3				0.0		
2		1.0-3.5 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)			ML	R1	96	0.0	NYOW-04-PH018-B	
3								0.0		
4	420	3.5-5.0 Gravelly silt with trace sand; maximum grain size 25 mm; 40% coarse, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 50% non-plastic fines with rapid dilatancy, low toughness, no dry strength; pinkish gray / grayish orange pink, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	40 / 10 / 50	5YR 7/2				0.0		
5		End boring at 5 ft bgs								
6										
7										

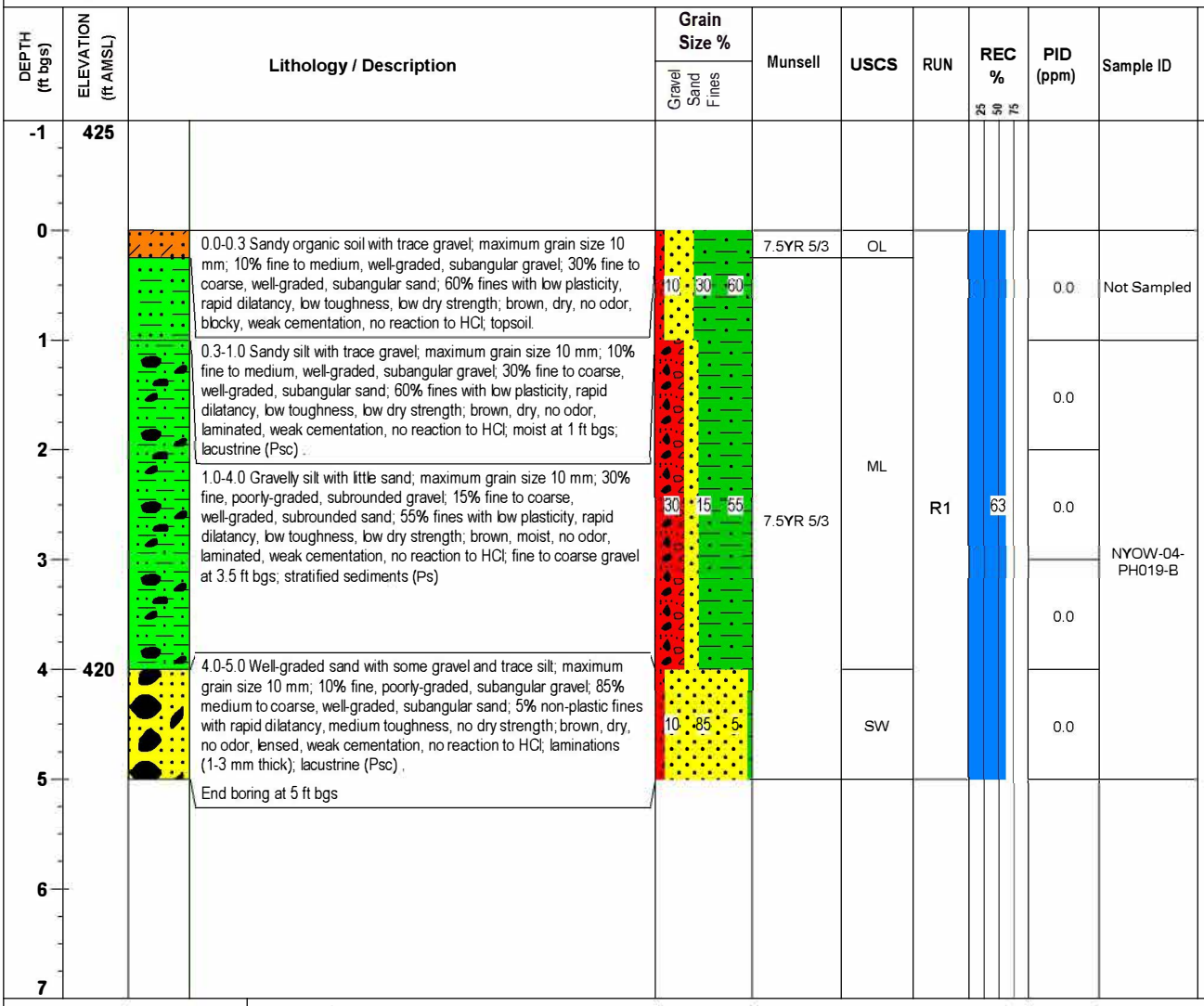
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-019
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167582.085, E 891253.281		**Surface Elevation:** 424 ft AMSL
Start Date: 1/25/2021	**End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-020
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

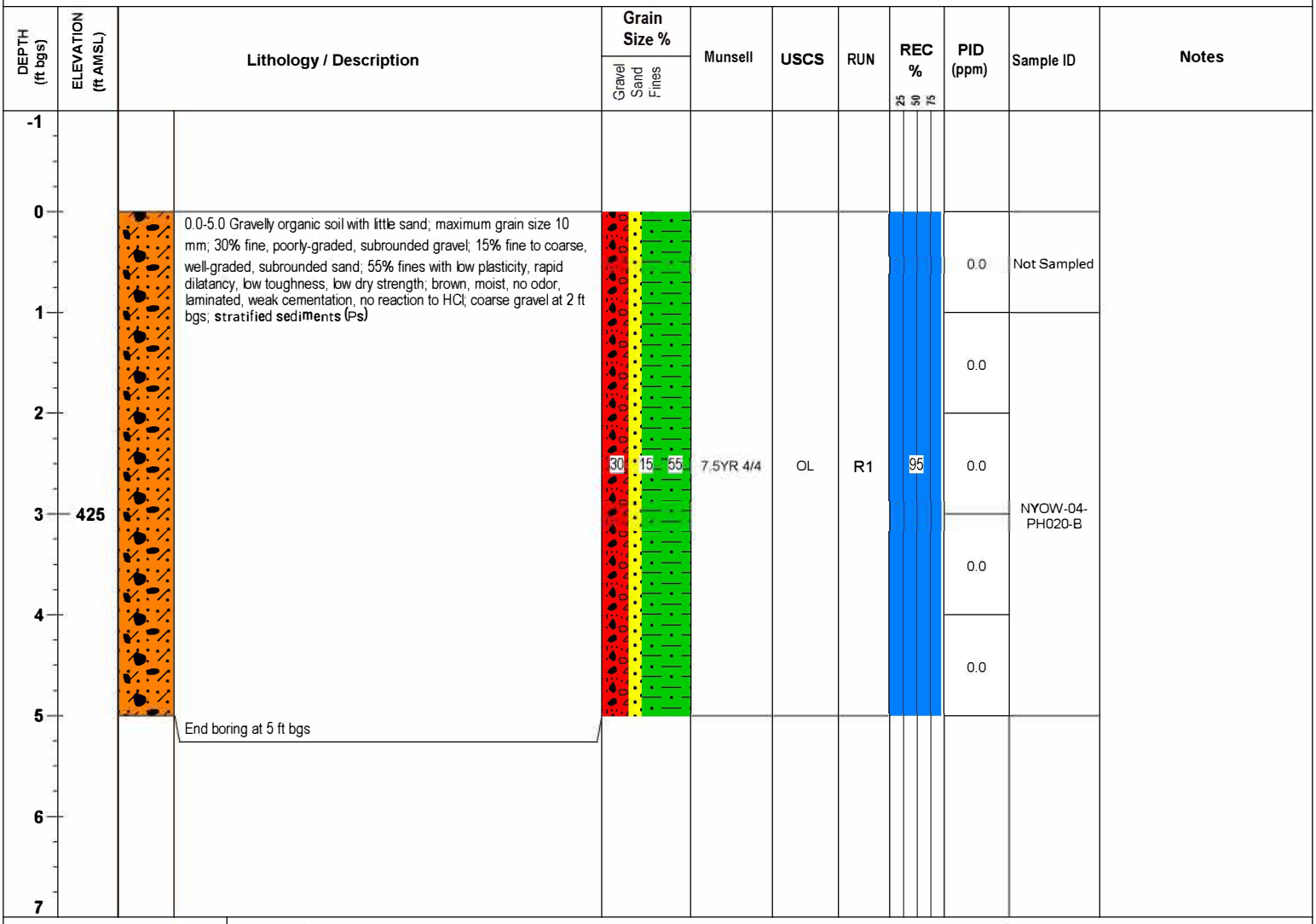
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167494.835, E 891285.456	**Surface Elevation:** 428 ft AMSL
Start Date: 1/27/2021 **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel | Fines | Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-021
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167476.785, E 891301.312	**Surface Elevation:** 426 ft AMSL
Start Date: 1/27/2021 **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	425	0.0-0.3 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.3-3.5 Gravelly silt with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	30 / 15 / 55	7.5YR 3/4	ML	R1	100	0.0	NYOW-04-PH021-B	
2								0.0		
3								0.0		
4		3.5-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3				0.0		
5		End boring at 5 ft bgs								
6	420									
7										

Legend

Gravel | Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-022
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

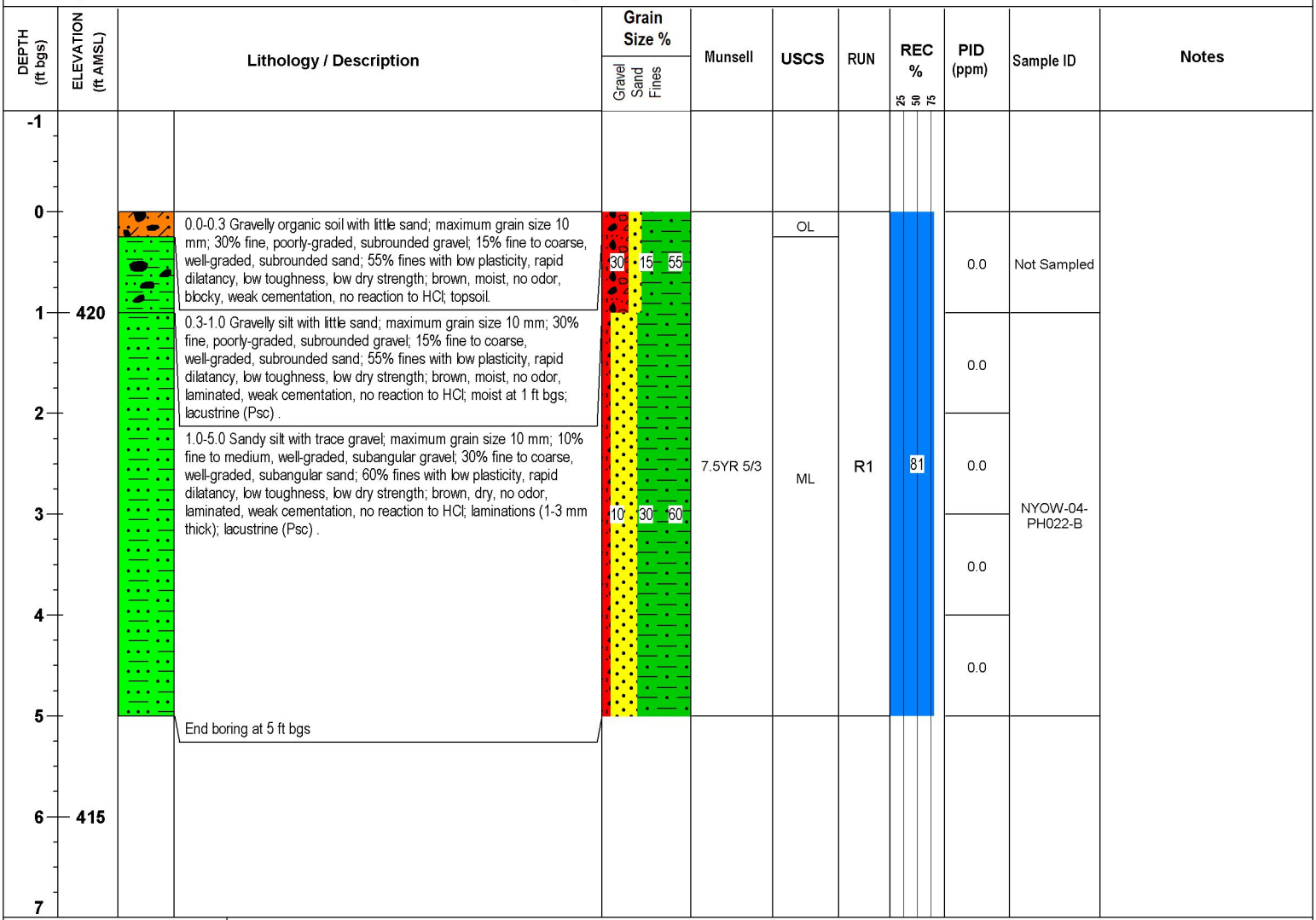
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167447.578, E 891373.261	**Surface Elevation:** 421 ft AMSL
Start Date: 1/25/2021 **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel | Fines | Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-023

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1167322.431, E 891478.764 | **Surface Elevation:** 421 ft AMSL

Start Date: 1/25/2021 | **End Date:** 1/25/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-1.0 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 5/3	OL	R1	90	0.0	Not Sampled	
1		1.0-1.5 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark reddish brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		2.5YR 3/3				0.0	NYOW-04-PH023-B	
2		1.5-4.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0		
3								0.0		
4		4.0-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark reddish brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		2.5YR 3/3				0.0		
5		End boring at 5 ft bgs								
6	415									
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-024

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1166966.19, E 891776.625 | **Surface Elevation:** 419 ft AMSL

Start Date: 1/25/2021 | **End Date:** 1/25/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-4.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2 ft bgs; lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML	R1	88	0.0	NYOW-04-PH024-B	
2								0.0		
3								0.0		
4	415							0.0		
5		4.5-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 5/1						
6		End boring at 5 ft bgs								
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-025

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1166851.084, E 891877.761 | **Surface Elevation:** 420 ft AMSL

Start Date: 1/25/2021 | **End Date:** 1/25/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.3 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 5/3	OL	R1	88	0.0	Not Sampled	
1		0.3-1.0 Gravelly silt with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist at 1 ft bgs; stratified sediments (Ps)						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist at 4 ft bgs; lacustrine (Psc) .	10 / 30 / 60		ML			0.0	NYOW-04-PH025-B	
3								0.0		
4								0.0		
5	415	End boring at 5 ft bgs								

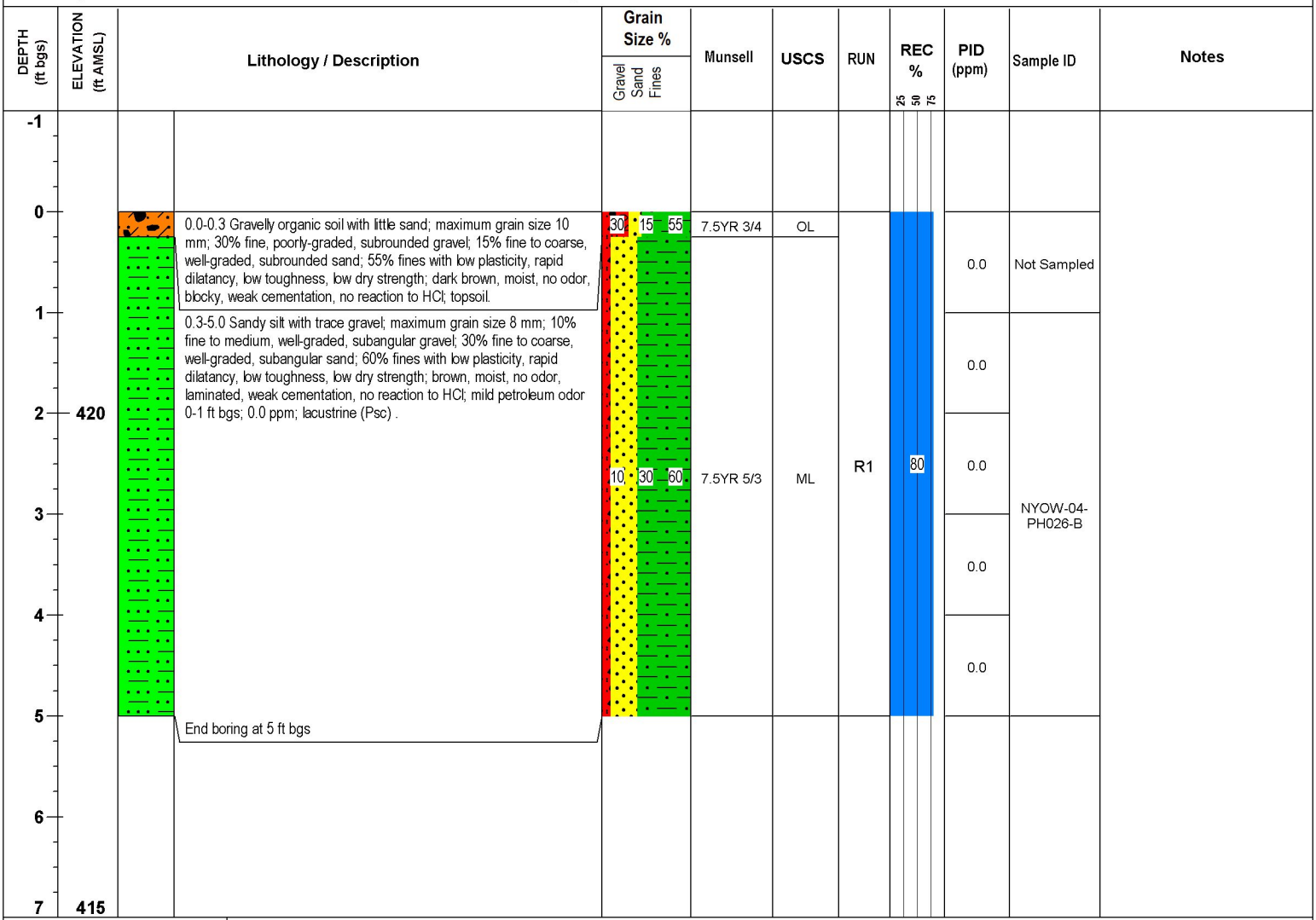
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-026
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166758.779, E 891904.294	**Surface Elevation:** 422 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-027
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166745.441, E 891919.819	**Surface Elevation:** 420 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.3 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 3/4	OL	R1	80	0.0	Not Sampled	
1		0.3-2.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; mild petroleum odor 0-1 ft bgs; 0.0 ppm; lacustrine (Psc) .		7.5YR 5/3				0.0	NYOW-04-PH027-B	
2								0.0		
3		2.5-4.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; olive gray / light olive gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	5Y 5/2	ML			0.0		
4								0.0		
5	415	4.5-5.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; olive gray / light olive gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) . End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-028
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166726.34, E 891977.982	**Surface Elevation:** 419 ft AMSL
Start Date: 1/25/2021 — **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-3.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine, poorly-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2 ft bgs; lacustrine (Psc) .						0.0		
2			10 / 30 / 60	7.5YR 5/3		R1	83	0.0		
3		3.0-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .			ML			0.0	NYOW-04-PH028-B	
4	415							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-029
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166603.993, E 892080.321		**Surface Elevation:** 417 ft AMSL
Start Date: 1/25/2021	**End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.3 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55		OL			0.0	Not Sampled	
1		0.3-4.0 Gravelly silt with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2' bgs; stratified sediments (Ps)						0.0		
2	415		30 / 15 / 55	7.5YR 5/3	ML	R1	100	0.0	NYOW-04-PH029-B	
3								0.0		
4		4.0-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/1				0.0		
5		End boring at 5 ft bgs								
6										
7	410									

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-030
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166496.518, E 892174.113	**Surface Elevation:** 416 ft AMSL
Start Date: 1/25/2021 **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	416	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1	415	0.5-3.5 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2 ft bgs; lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML	R1	100	0.0	NYOW-04-PH030-B	
2								0.0		
3								0.0		
4		3.5-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 5/1				0.0		
5		End boring at 5 ft bgs								
6	410									
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-031
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166392.532, E 892213.694	**Surface Elevation:** 420 ft AMSL
Start Date: 1/27/2021 **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel | Fines | Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-032
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

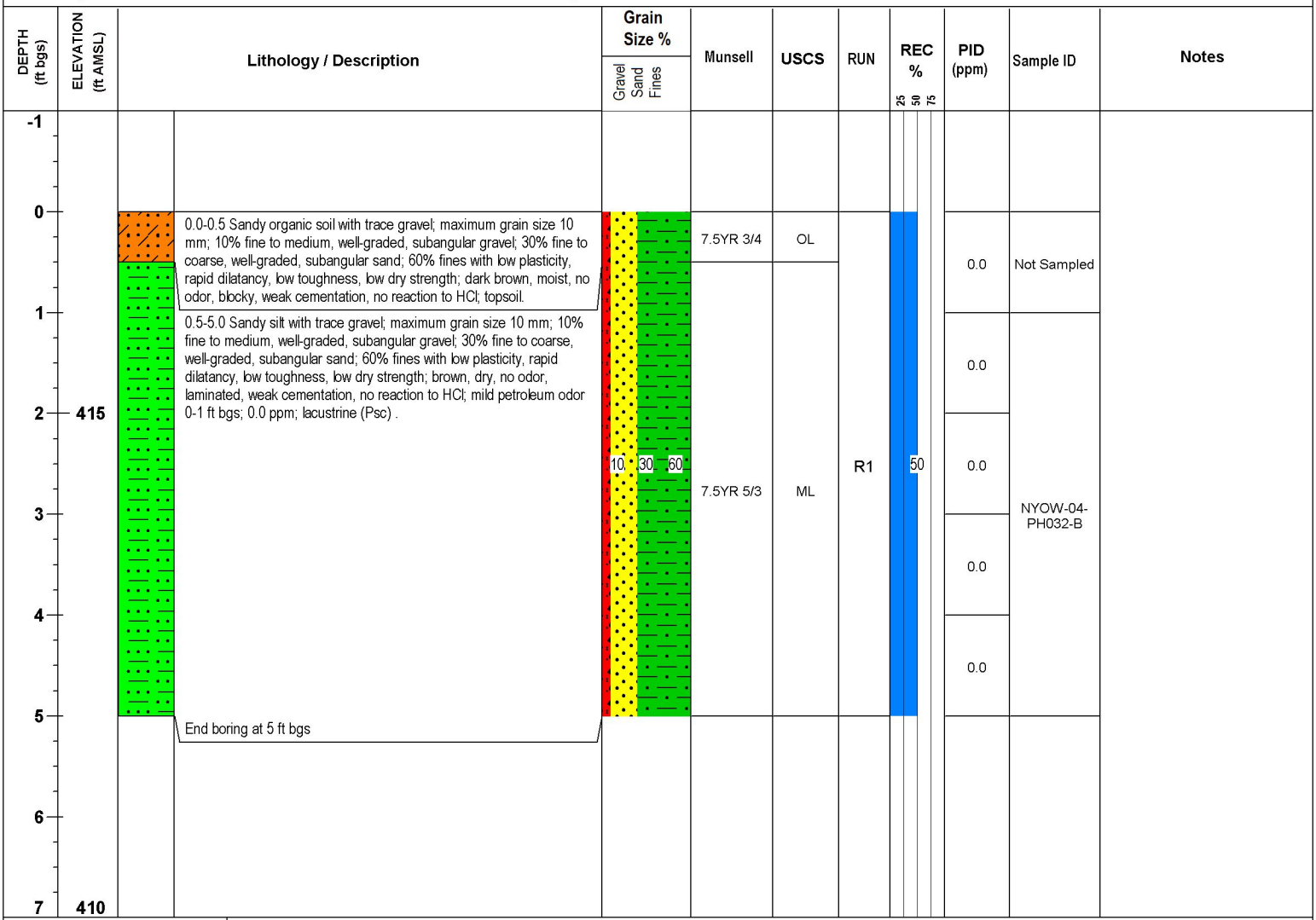
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166376.94, E 892227.505	**Surface Elevation:** 417 ft AMSL
Start Date: 1/27/2021 **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-033
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166332.919, E 892308.309	**Surface Elevation:** 414 ft AMSL
Start Date: 1/25/2021 — **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	414	0.0-1.0 Sandy organic soil with trace gravel, maximum grain size 10 mm; 10% fine, poorly-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		1.0-4.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine, poorly-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)	10 / 30 / 60	7.5YR 5/3	ML	R1	96	0.0	NYOW-04-PH033-B	
2								0.0		
3								0.0		
4	410	4.0-5.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; light gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	30 / 15 / 55	N7				0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-034
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166215.07, E 892405.621	**Surface Elevation:** 414 ft AMSL
Start Date: 1/25/2021 **End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-2.5 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2 ft bgs; lacustrine (Psc) .						0.0		
2								0.0		
3		2.5-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML	R1	100	0.0	NYOW-04-PH034-B	
4	410							0.0		
5		End boring at 5 ft bgs						0.0		

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-035
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166091.182, E 892506.384		**Surface Elevation:** 412 ft AMSL
Start Date: 1/25/2021	**End Date:** 1/25/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-4.5 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; moist and soft 1-2 ft bgs; lacustrine (Psc) .						0.0		
2	410		10 / 30 / 60	7.5YR 5/3	ML	R1	100	0.0		
3								0.0	NYOW-04-PH035-B	
4								0.0		
5		4.5-5.0 Sandy silt with trace gravel; maximum grain size 10 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .		7.5YR 5/1	ML					
6		End boring at 5 ft bgs								
7	405									

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-036

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC-4 Central Transect | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1168139.291, E 891117.748 | **Surface Elevation:** 424.767 ft AMSL

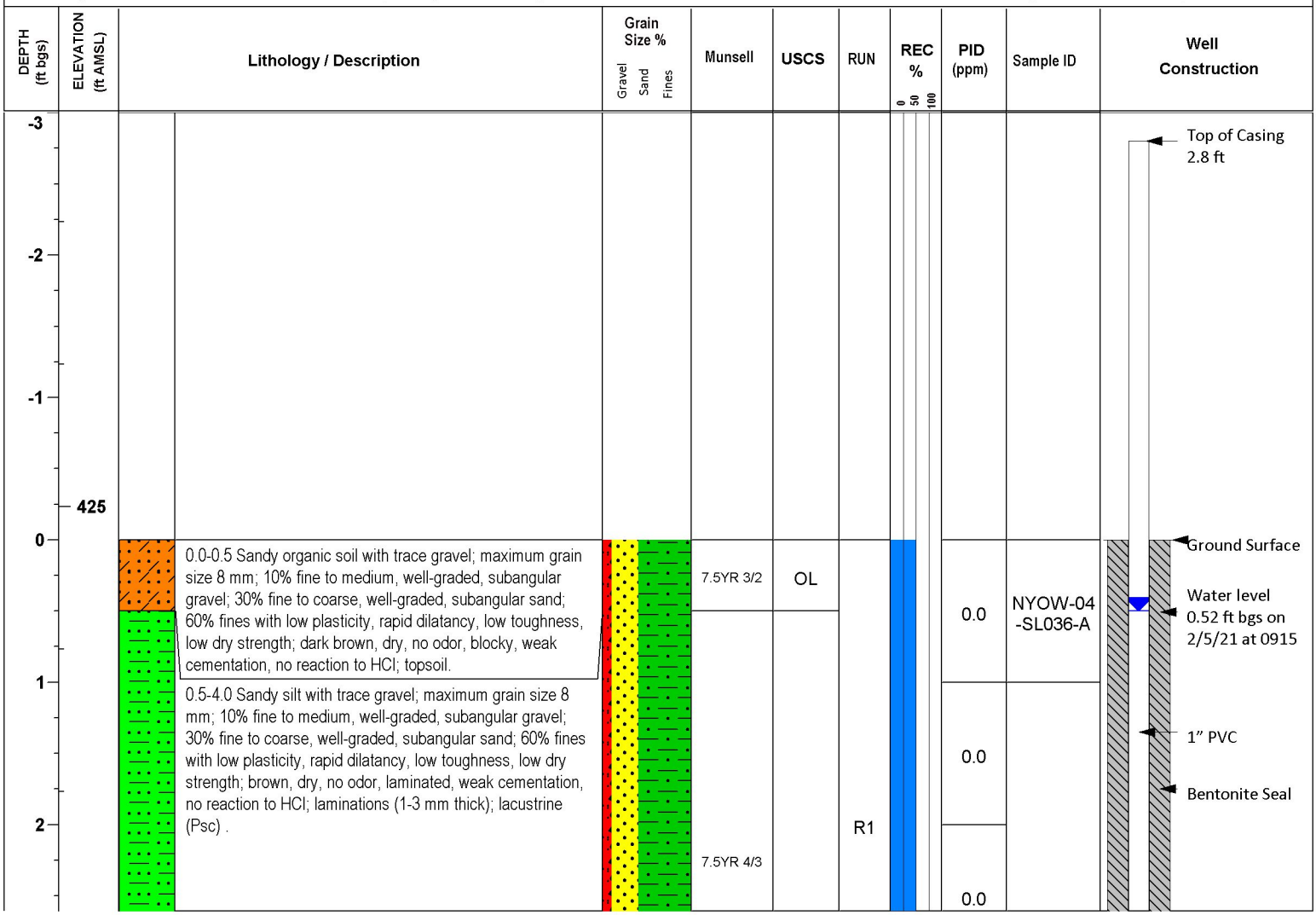
Start Date: 2/2/2021 | **End Date:** 2/2/2021 | **Casing Elevation:** 427.637 ft AMSL

Depth to Groundwater: 8 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 15.5 ft bgs

Depth to Water and Elapse Time After Drilling: 3.32 ft btoc on 2/5/21 at 0915

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 5.5 to 15.5 ft bgs; 2.8 ft Stick-up



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.32 ft btoc = 0.52 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-036

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3								0.0	NYOW-04-PH036-B	
4		4.0-7.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; yellowish brown / moderate yellowish brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
	420			10YR 5/4						
5								0.0		
6						R2		0.0		
7		7.0-8.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 · 30 — 60					0.0	NYOW-04-PH036-C	
8		8.0-9.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .			ML			0.0		Wet at 8 to 9 ft bgs
9		9.0-13.0 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R3		0.0		Filter Pack
	415									
10				7.5YR 4/3				0.0		1" PVC Screen
11								0.0		

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.32 ft btoc = 0.52 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-036

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 – 50 – 100)	PID (ppm)	Sample ID	Well Construction
12						R4		0.0	NYOW-04-WL036-A	
13		13.0-15.5 Sandy silt with trace gravel; maximum grain size 8 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
14				2.5Y 5/1		R5				
	410							0.0		
15		Refusal at 15.5 ft bgs								
16										
17										
18										
19										
	405									
20										
21										

Grain Size Legend

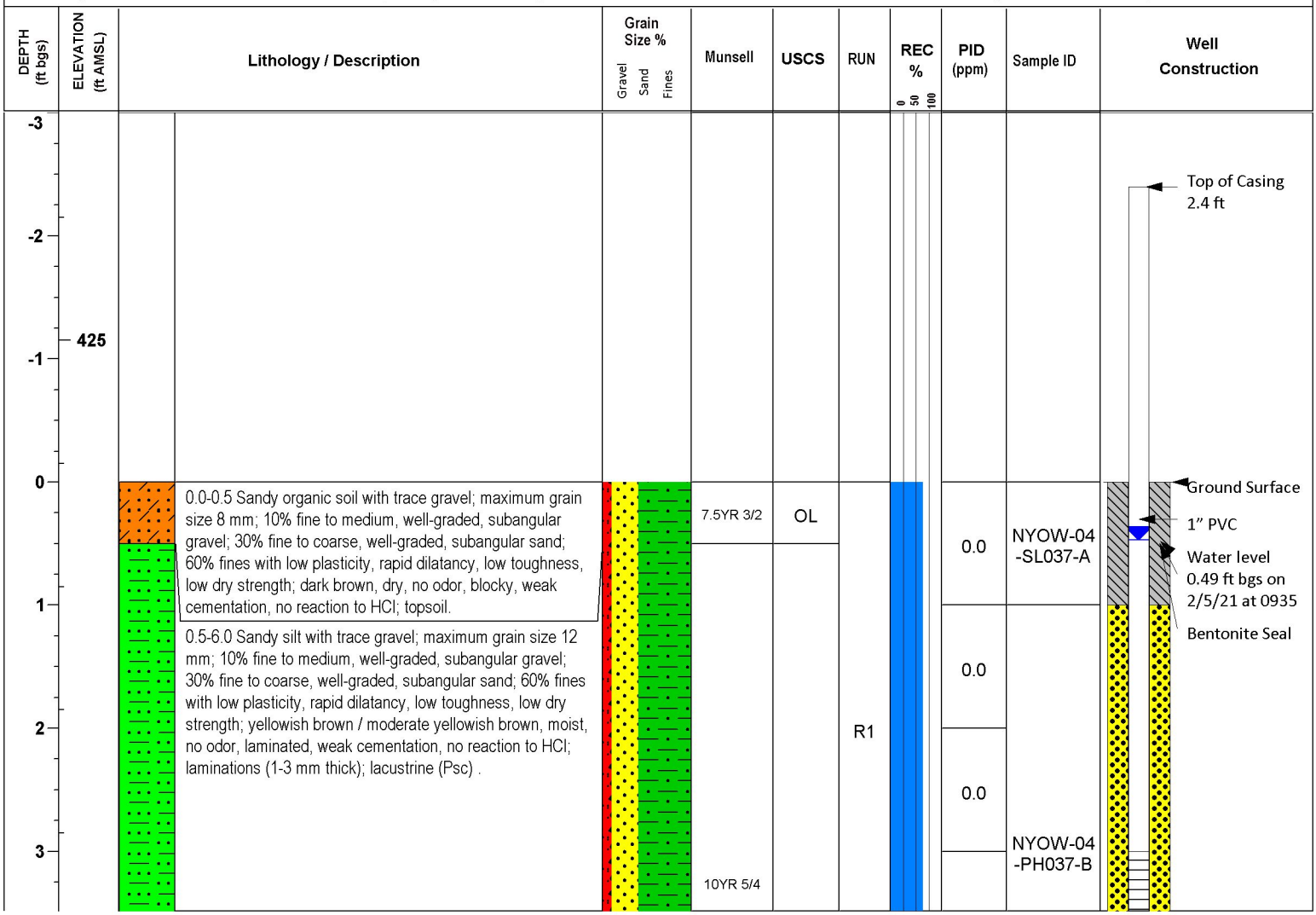
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.32 ft btoc = 0.52 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-037
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Central Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167223.739, E 891907.995		**Surface Elevation:** 423.85 ft AMSL
Start Date: 2/3/2021	**End Date:** 2/3/2021	**Casing Elevation:** 426.37 ft AMSL
Depth to Groundwater: 0.5 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 13 ft bgs
Depth to Water and Elapse Time After Drilling: 2.89 ft btoc on 2/5/21 at 0935		
Other Water Level Measurements: Moist at 0.5 to 5 ft bgs		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 3 to 13 ft bgs; 2.4 ft Stick-up		



Grain Size Legend

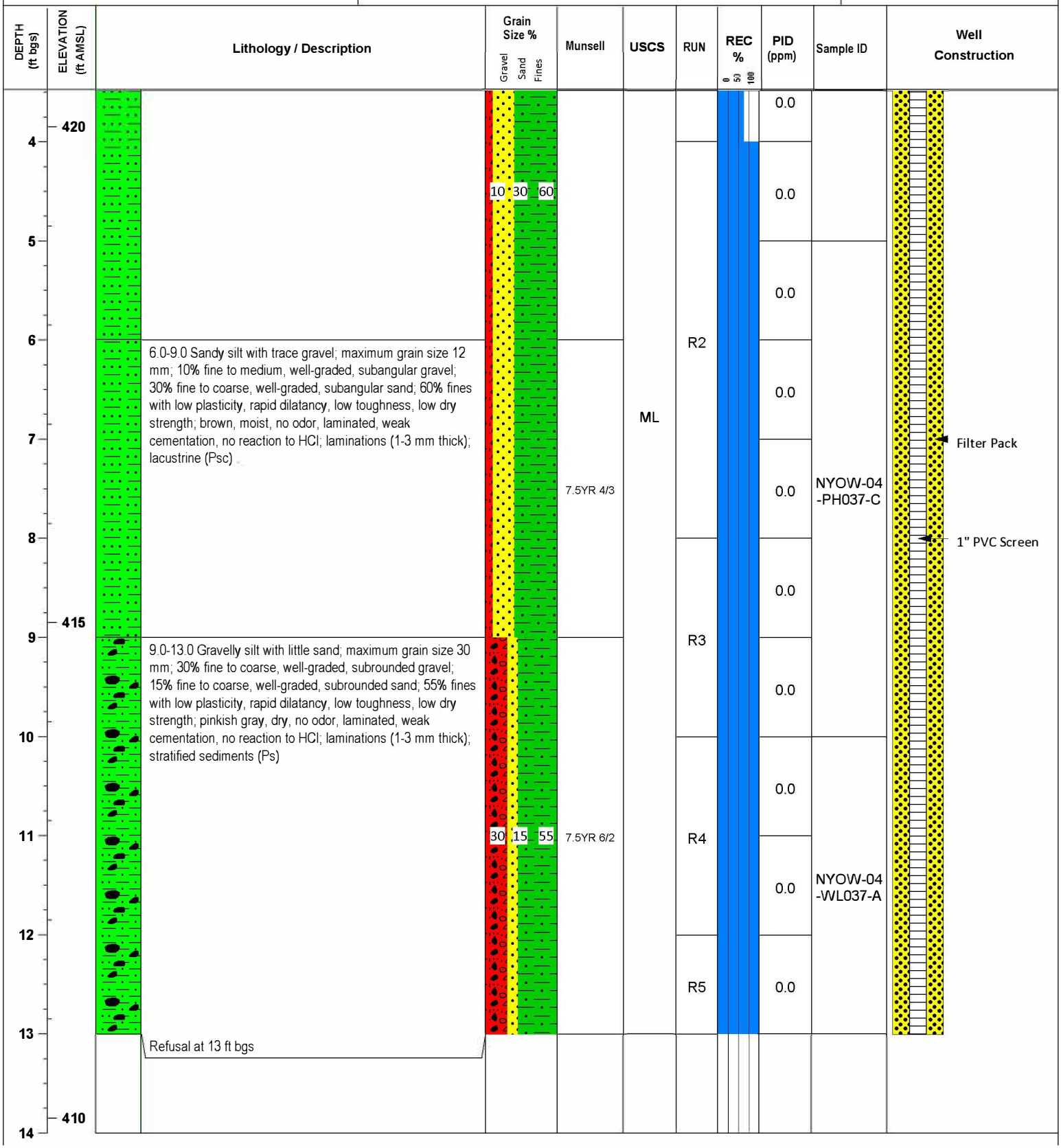
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 2.89 ft btoc = 0.49 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-037

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

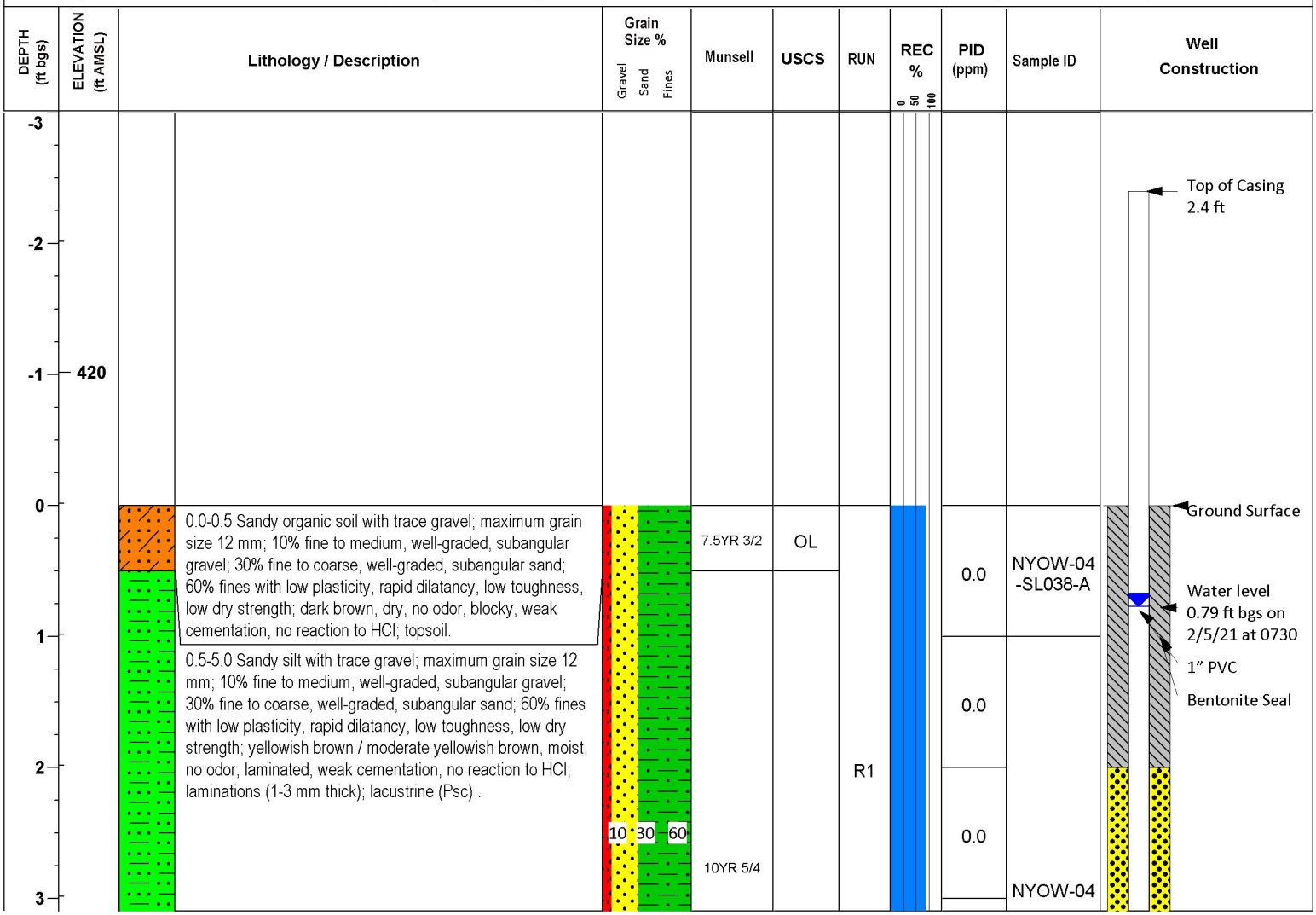
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 2.89 ft btoc = 0.49 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-038
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Central Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166378.625, E 892636.086		**Surface Elevation:** 418.983 ft AMSL
Start Date: 2/3/2021	**End Date:** 2/3/2021	**Casing Elevation:** 421.5 ft AMSL
Depth to Groundwater: 0.5 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft / **Total Depth:** 11 ft bgs
Depth to Water and Elapse Time After Drilling: 3.19 ft btoc on 2/5/21 at 0730		
Other Water Level Measurements: Moist at 0.5 to 9 ft bgs		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 4 to 11 ft bgs; 2.4 ft Stick-up		



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.19 ft btoc = 0.79 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-038

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
4	415							0.0	-PH038-B	
								0.0		
5		5.0-11.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)			ML			0.0		
6						R2		0.0		Filter Pack
7								0.0		
8			30 / 15 / 55	7.5YR 4/3				0.0	NYOW-04 -PH038-C	1" PVC Screen
9	410					R3		0.0		
10								0.0		
						R4		0.0	NYOW-04 -WL038-A	
11		Refusal at 11 ft bgs								
12										
13										

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 3.19 ft btoc = 0.79 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-039
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

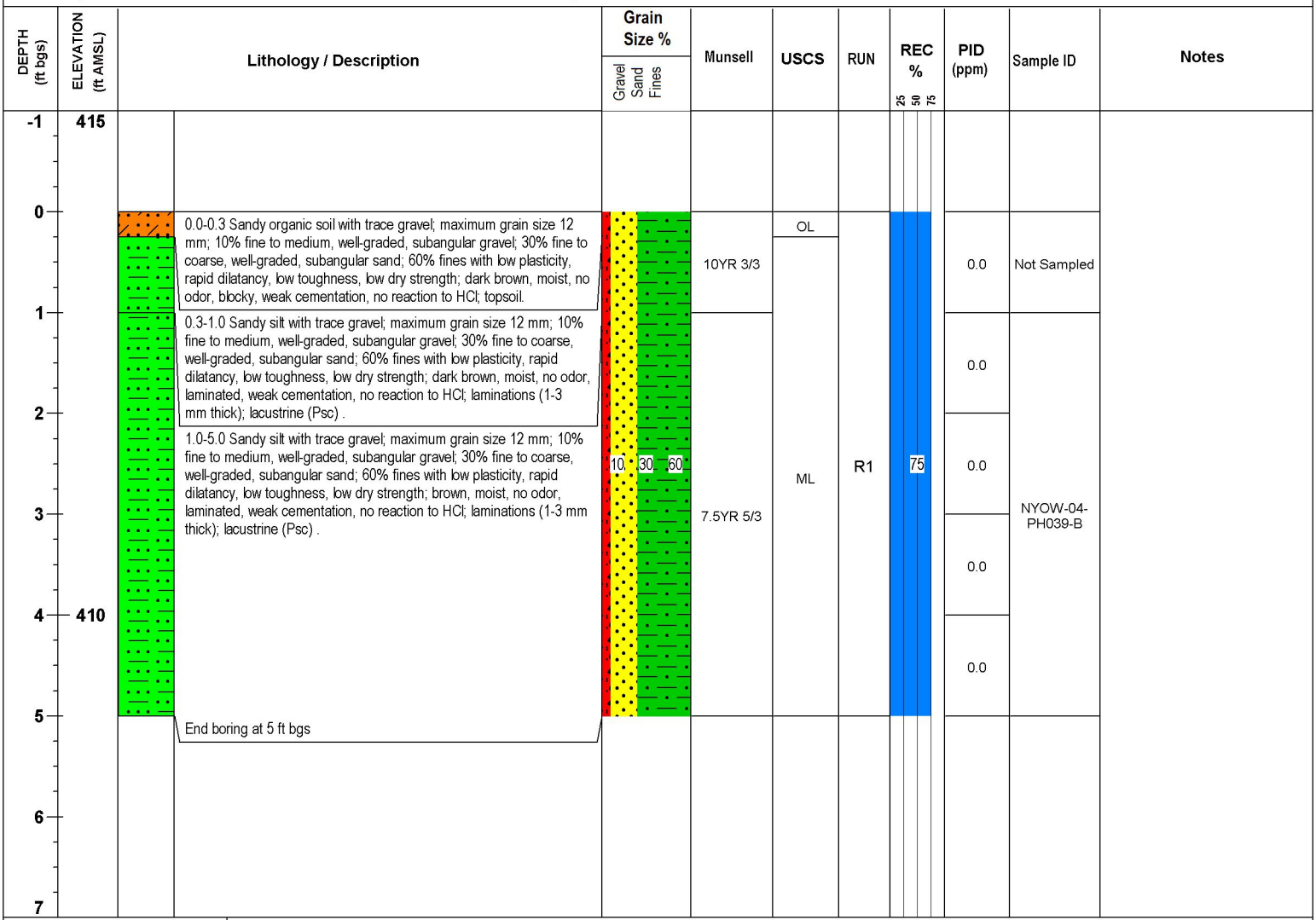
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168879.706, E 890664.678	**Surface Elevation:** 414 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel | Fines | Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-040
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168859.096, E 890779.101	**Surface Elevation:** 409 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 12 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	94	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 12 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 12 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH040-B	
3								0.0		
4	405							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-041
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168794.211, E 890887.57	**Surface Elevation:** 409 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 2.25ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 12 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	10 / 30 / 60	10YR 3/3	OL	R1	77	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet at 2.25 to 2.75 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH041-B	
3								0.0		
4	405							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-042

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Bunker Discharge | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1168733.503, E 890896.27 | **Surface Elevation:** 413 ft AMSL

Start Date: 1/27/2021 | **End Date:** 1/27/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-1.0 Gravelly organic soil with little sand; maximum grain size 20 mm; 30% fine, poorly-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 3/4	OL	R1	75	0.0	Not Sampled	
1		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2								0.0		
3	410		10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH042-B	
4								0.0		
5		End boring at 5 ft bgs								
6										
7										

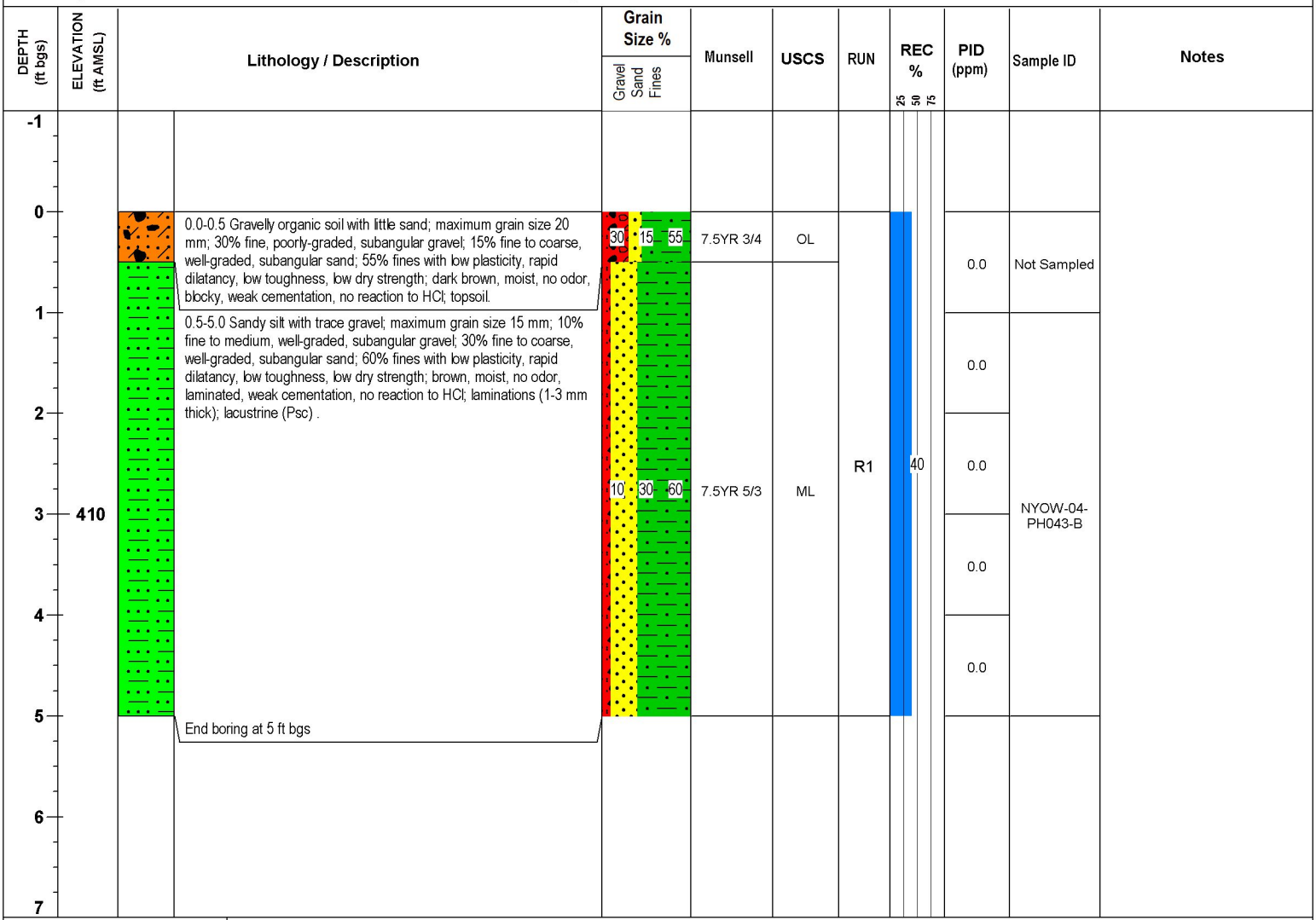
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-043
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168715.841, E 890909.664	**Surface Elevation:** 413 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-044
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168658.358, E 891004.58	**Surface Elevation:** 411 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 2.5 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	60	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 2.5 to 3 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH044-B	
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								
6	405									
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-045
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168542.474, E 891106.441	**Surface Elevation:** 411 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 2.5 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	75	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 2.5 to 3 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH045-B	
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								
6	405									
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-046
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168435.738, E 891193.547	**Surface Elevation:** 412 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	100	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, moist from 3 to 3.5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH046-B	
3								0.0		
4								0.0		
5	405	End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-047
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

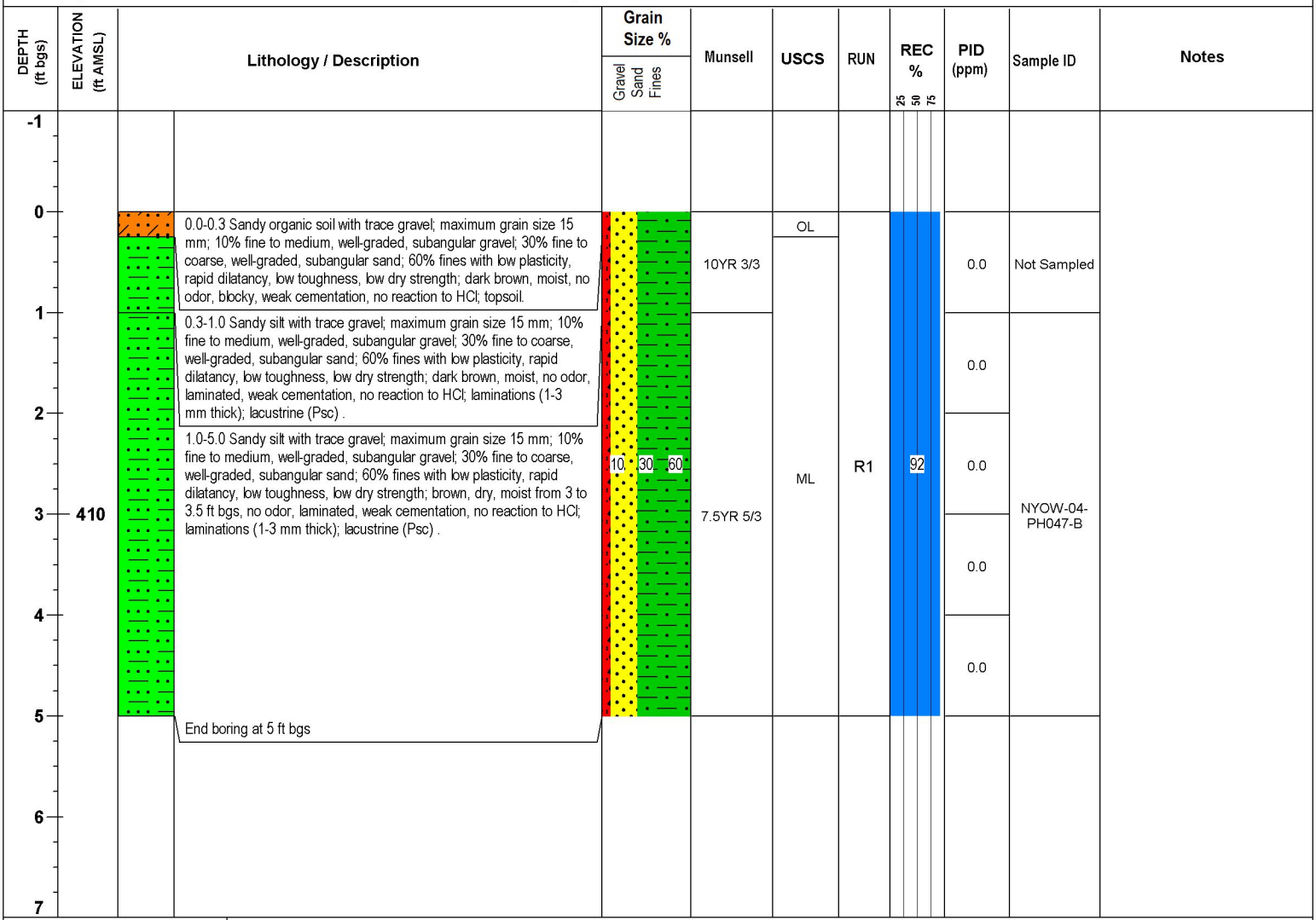
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1168150.888, E 891430.262	**Surface Elevation:** 413 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-048

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1168067.191, E 891501.113 | **Surface Elevation:** 414 ft AMSL

Start Date: 1/26/2021 | **End Date:** 1/26/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL			0.0	Not Sampled	
1		0.3-0.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		0.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, moist from 3 to 3.5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML	R1	92	0.0	NYOW-04-PH048-B	
3								0.0		
4	410							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

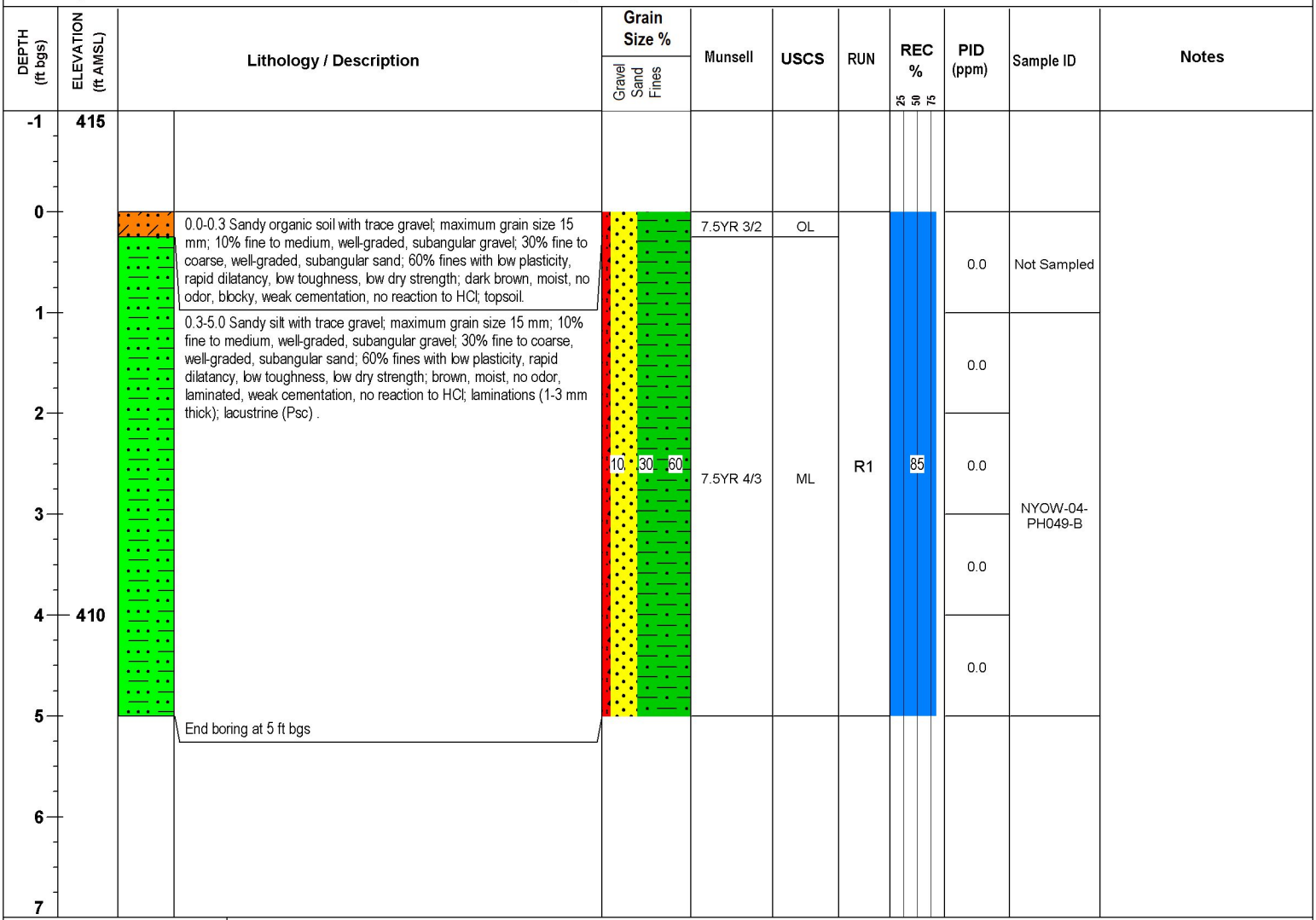
Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-049
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167998.901, E 891518.243		**Surface Elevation:** 414 ft AMSL
Start Date: 2/4/2021	**End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

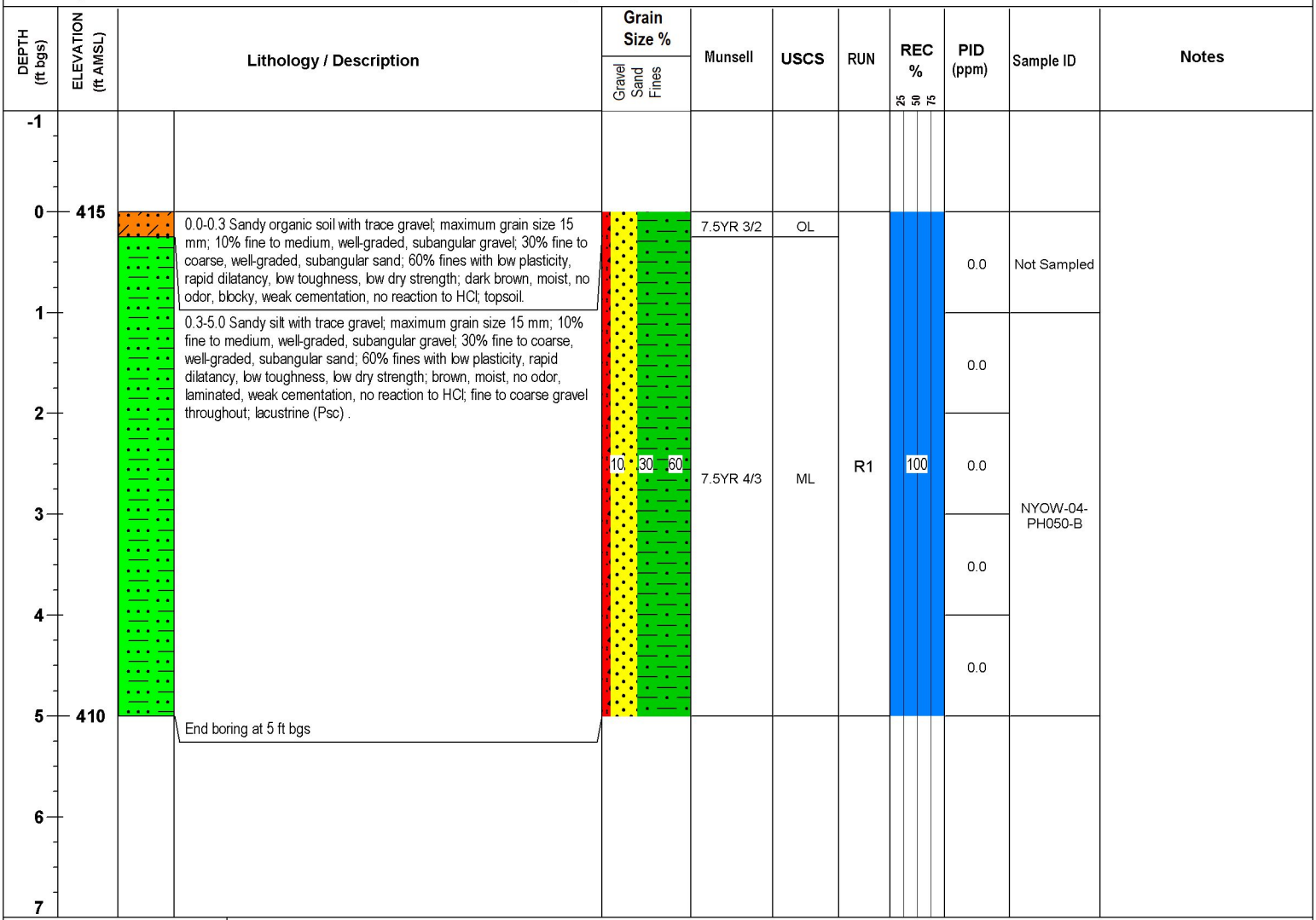
Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-050
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167981.37, E 891529.013		**Surface Elevation:** 415 ft AMSL
Start Date: 2/4/2021	**End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-051

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1167947.843, E 891602.951 | **Surface Elevation:** 413 ft AMSL

Start Date: 1/26/2021 | **End Date:** 1/26/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 2.5 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.3 Sandy organic soil with trace gravel, maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	10 / 30 / 60	7.5YR 5/3	OL	R1	100	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	30 / 15 / 55					0.0		
2		1.0-2.5 Gravelly silt with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)			ML			0.0	NYOW-04-PH051-B	
3	410	2.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, wet, dry from 3 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60					0.0		
4								0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-052

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1167830.141, E 891700.394 | **Surface Elevation:** 416 ft AMSL

Start Date: 1/26/2021 | **End Date:** 1/26/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 2.5 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-2.0 Gravelly organic soil with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 5/3	OL	R1	75	0.0	Not Sampled	
1								0.0	NYOW-04-PH052-B	
2		2.0-4.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; yellowish brown / moderate yellowish brown, dry, wet from 2.5 to 3 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	10YR 5/4	ML			0.0		
3								0.0		
4								0.0		
5	410	4.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) . End boring at 5 ft bgs		7.5YR 5/3						
6										
7										

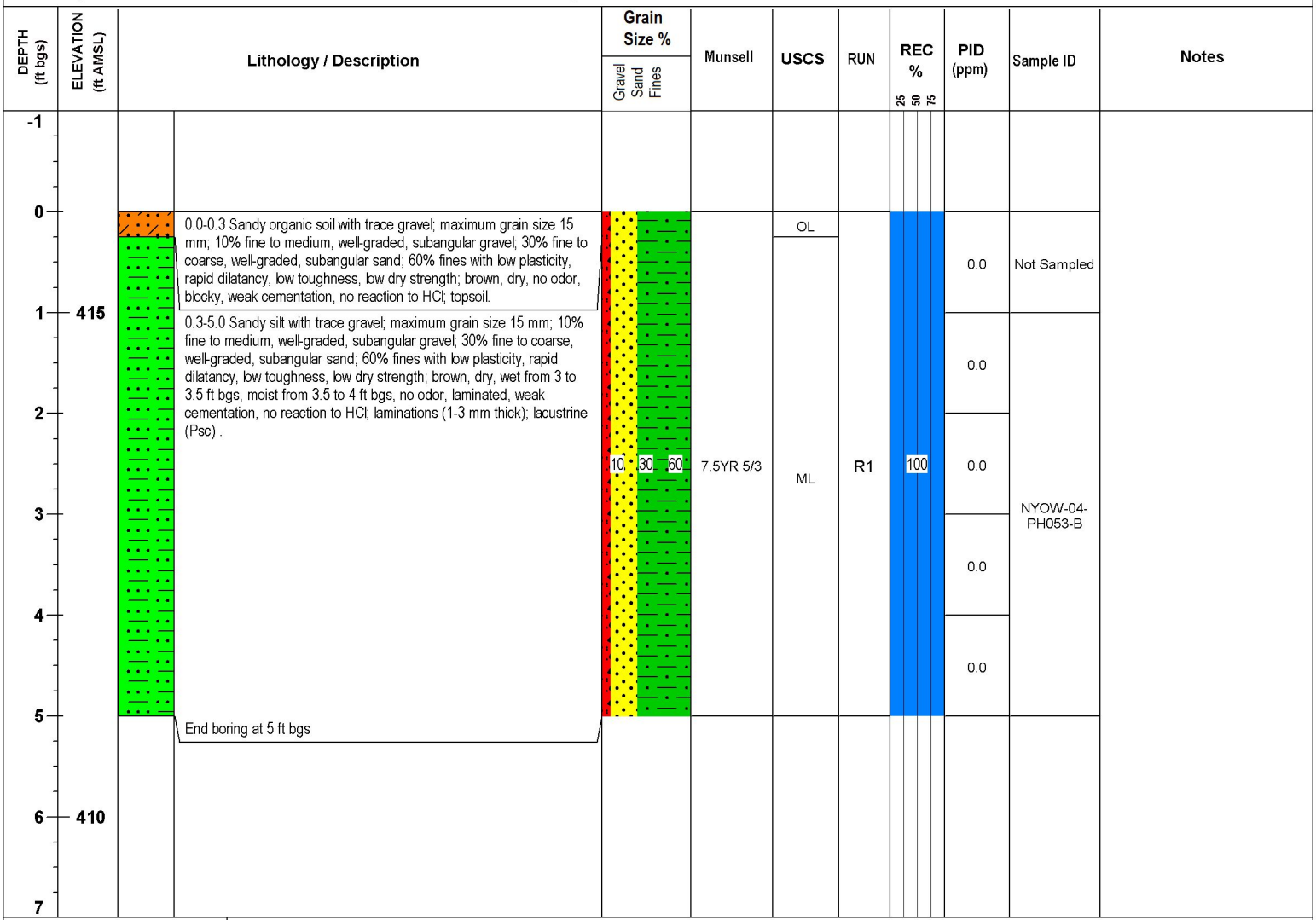
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-053
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167716.079, E 891791.083	**Surface Elevation:** 416 ft AMSL
Start Date: 1/26/2021 — **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 3 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-054
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056
Date: 3/3/21	
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167634.506, E 891824.624	**Surface Elevation:** 418 ft AMSL
Start Date: 2/4/2021 **End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL			0.0	Not Sampled	
1		0.3-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2			10 / 30 / 60	7.5YR 4/3	ML	R1	50	0.0		
3	415							0.0	NYOW-04-PH054-B	
4								0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-055
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167617.791, E 891840.253	**Surface Elevation:** 419 ft AMSL
Start Date: 2/4/2021 **End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL	R1	96	0.0	Not Sampled	
1		0.3-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 4/3	ML			0.0	NYOW-04-PH055-B	
2								0.0		
3								0.0		
4	415							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-056
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167591.924, E 891901.368	**Surface Elevation:** 418 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 3 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	100	0.0	Not Sampled	
1		0.5-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 3 to 3.5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60					0.0		
3	415			7.5YR 5/3	ML			0.0	NYOW-04-PH056-B	
4								0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-057
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167478.369, E 891999.348		**Surface Elevation:** 418 ft AMSL
Start Date: 1/26/2021	**End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 3 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	94	0.0	Not Sampled	
1		0.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 3 to 3.5 ft bgs, dry from 4.5 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2								0.0		
3	415		10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH057-B	
4								0.0		
5		End boring at 5 ft bgs						0.0		
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-058

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1167354.45, E 892100.946 | **Surface Elevation:** 418 ft AMSL

Start Date: 1/26/2021 | **End Date:** 1/26/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 3 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	418	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	75	0.0	Not Sampled	
1		0.3-0.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0	NYOW-04-PH058-B	
2		0.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 3 to 3.5 ft bgs, dry from 4 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0		
3	415							0.0		
4								0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-059
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167264.608, E 892133.211	**Surface Elevation:** 418 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 3 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.3 Gravelly organic soil with little sand; maximum grain size 20 mm; 30% fine, poorly-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 3/4	OL	R1	50	0.0	Not Sampled	
1		0.3-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, wet from 3 to 3.5 ft bgs, moist from 3.5 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2								0.0		
3	415		10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH059-B	
4								0.0		
5		End boring at 5 ft bgs						0.0		
6										
7										

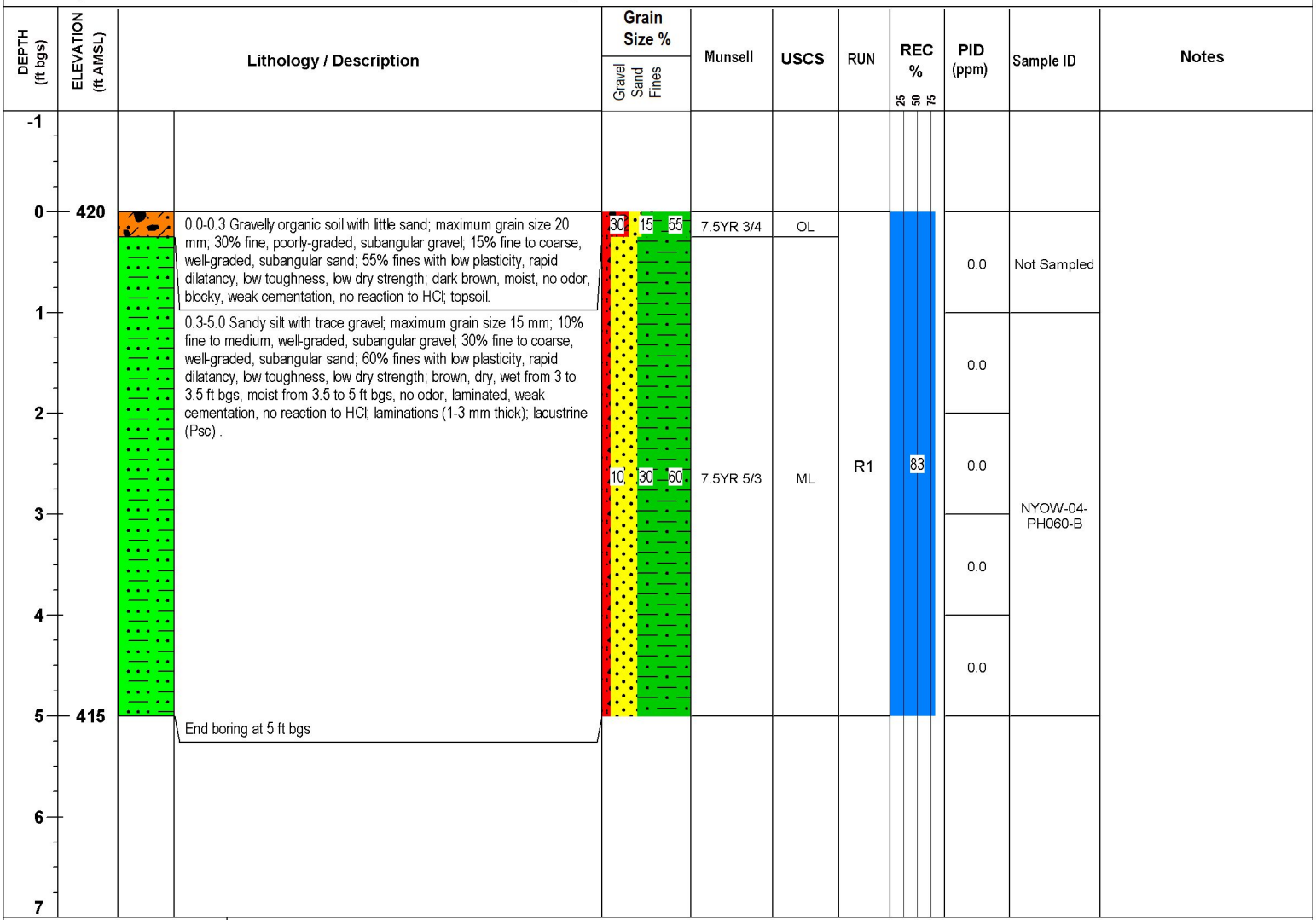
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-060
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167250.199, E 892149.119	**Surface Elevation:** 420 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 3 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



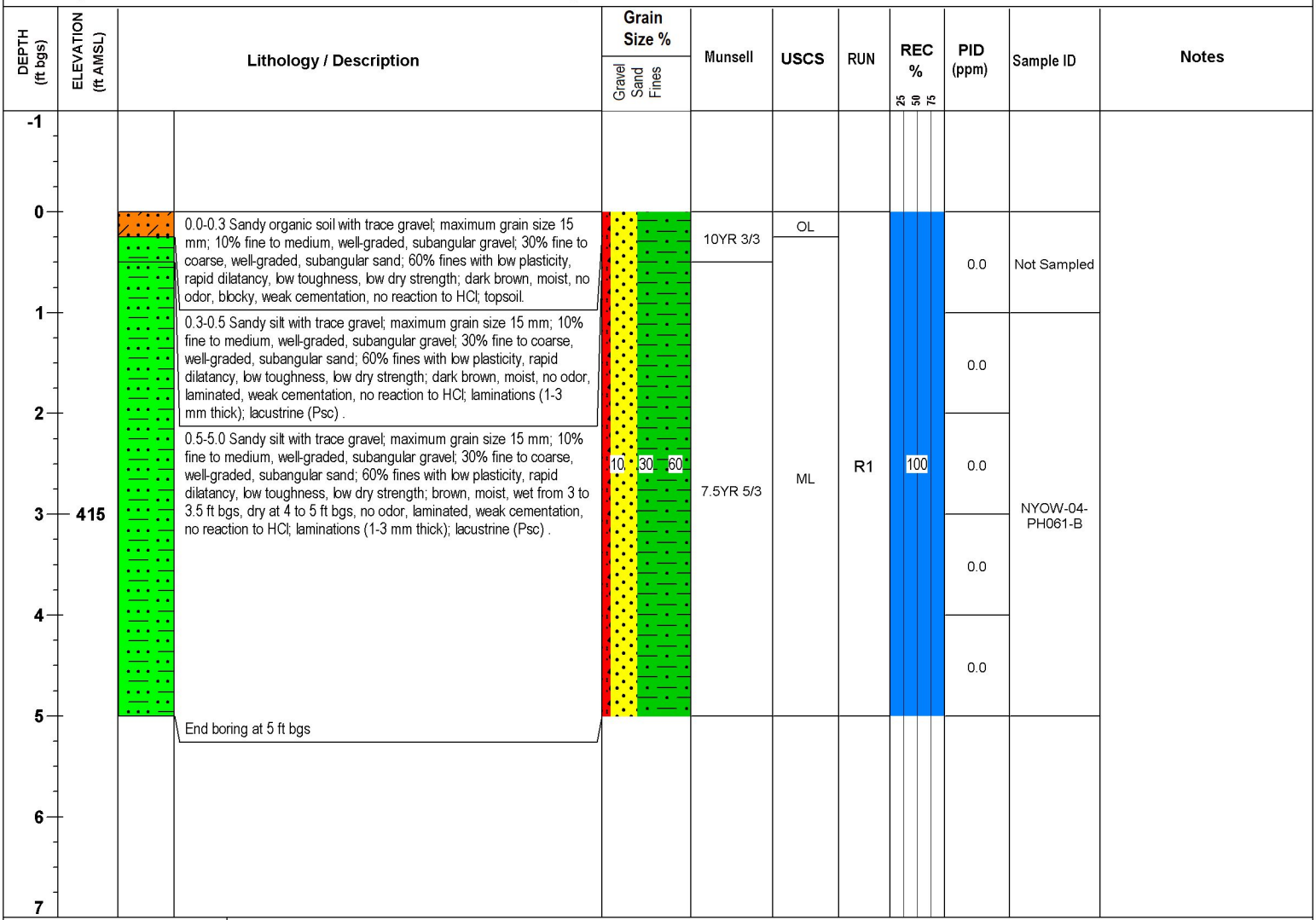
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-061
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167217.017, E 892211.997	**Surface Elevation:** 418 ft AMSL
Start Date: 1/26/2021 — **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 3 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-062
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167115.12, E 892307.62		**Surface Elevation:** 416 ft AMSL
Start Date: 1/26/2021	**End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 3 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	100	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 3 to 3.5 ft bgs, dry at 4 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH062-B	
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								
6	410									
7										

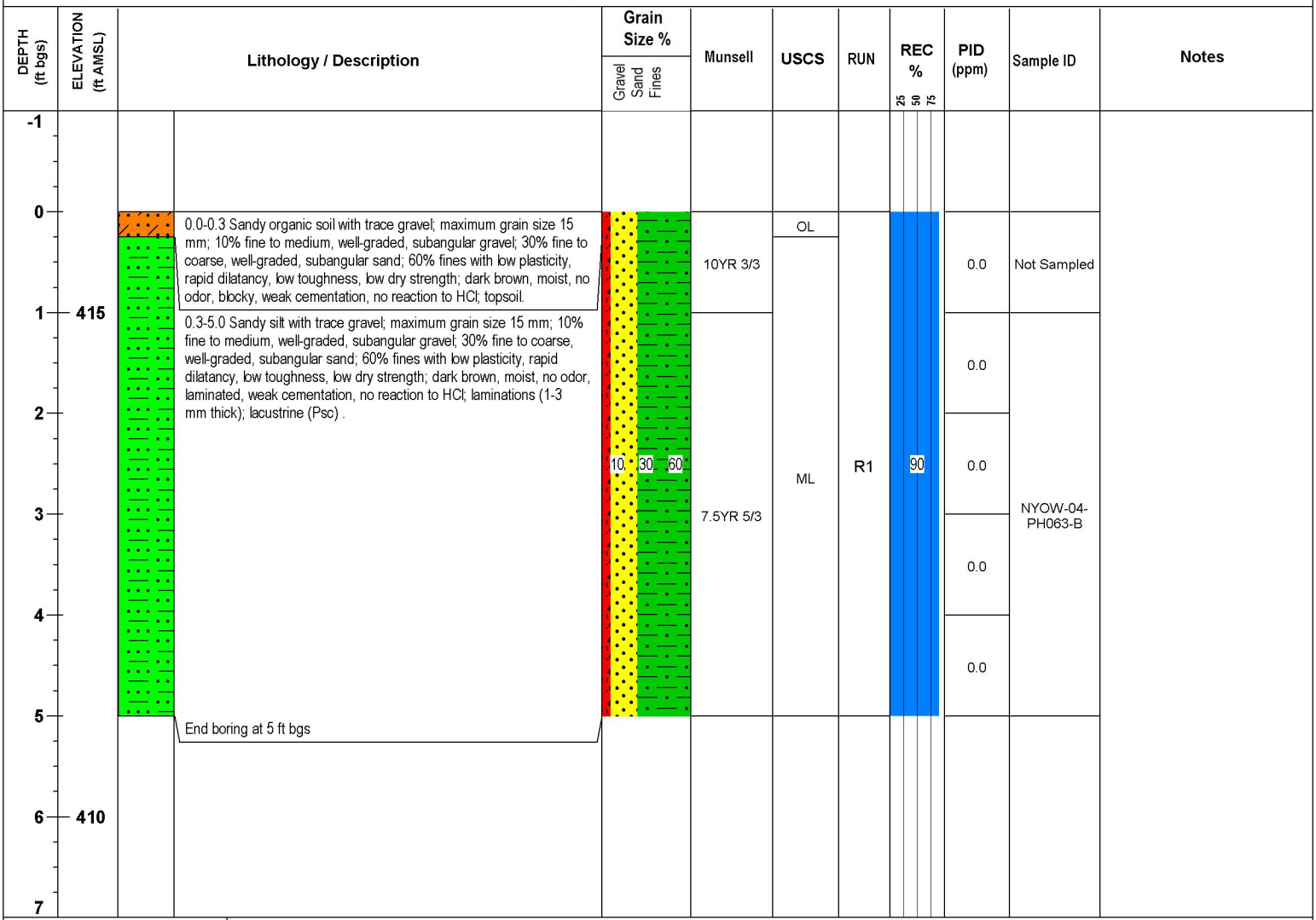
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-063
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166983.249, E 892416.051	**Surface Elevation:** 416 ft AMSL
Start Date: 1/26/2021 — **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 1.5 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

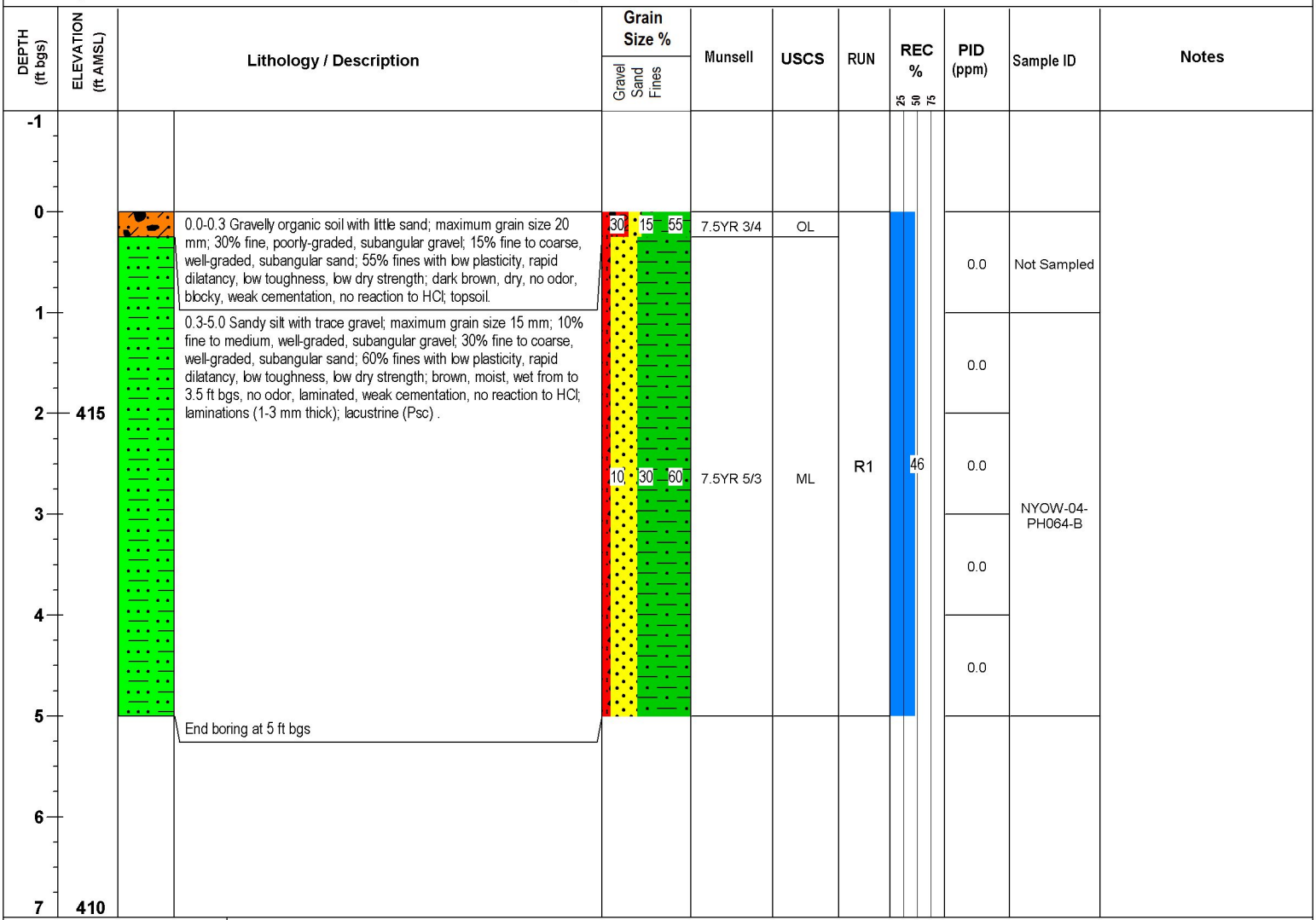
Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-064
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166894.315, E 892444.206	**Surface Elevation:** 417 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 1.5 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-065
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166878.069, E 892454.056	**Surface Elevation:** 418 ft AMSL
Start Date: 1/27/2021 — **End Date:** 1/27/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 3 ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	418	0.0-0.3 Gravelly organic soil with little sand; maximum grain size 20 mm; 30% fine, poorly-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	30 / 15 / 55	7.5YR 3/4	OL	R1	69	0.0	Not Sampled	
1		0.3-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, wet from 3 to 3.5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2								0.0		
3	415		10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH065-B	
4								0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-066

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 4 Swale | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1166865.455, E 892513.976 | **Surface Elevation:** 415 ft AMSL

Start Date: 1/26/2021 | **End Date:** 1/26/2021 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 3 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	94	0.0	Not Sampled	
1		0.3-1.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; strong brown, moist, wet from 3 to 4 ft bgs, dry at 4 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/8	ML			0.0	NYOW-04-PH066-B	
3								0.0		
4				7.5YR 5/3				0.0		
5	410	End boring at 5 ft bgs								

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-067
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056
Date: 3/3/21	
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166742.06, E 892619.243	**Surface Elevation:** 415 ft AMSL
Start Date: 1/26/2021	**End Date:** 1/26/2021 — **Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 1 ft bgs	**Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	63	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, wet, dry 1.5 to 5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH067-B	
3								0.0		
4								0.0		
5	410	End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-068
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166639.305, E 892707.297	**Surface Elevation:** 416 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	415	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		10YR 3/3	OL	R1	79	0.0	Not Sampled	
1		0.3-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML			0.0	NYOW-04-PH068-B	
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								
6	410									
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-069
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166534.551, E 892753.931	**Surface Elevation:** 419 ft AMSL
Start Date: 2/4/2021 **End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	420	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL			0.0	Not Sampled	
1		0.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel at 4 ft bgs; lacustrine (Psc) .						0.0		
2			10 / 30 / 60			R1	100	0.0		
3				7.5YR 4/3	ML			0.0	NYOW-04-PH069-B	
4	415							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-070
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166518.365, E 892766.408	**Surface Elevation:** 416 ft AMSL
Start Date: 2/4/2021 — **End Date:** 2/4/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	416	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL	R1	85	0.0	Not Sampled	
1	415	0.3-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel at 4.25 ft bgs; lacustrine (Psc) .	10 / 30 / 60	7.5YR 4/3	ML			0.0	NYOW-04-PH070-B	
2								0.0		
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								
6	410									
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-071
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

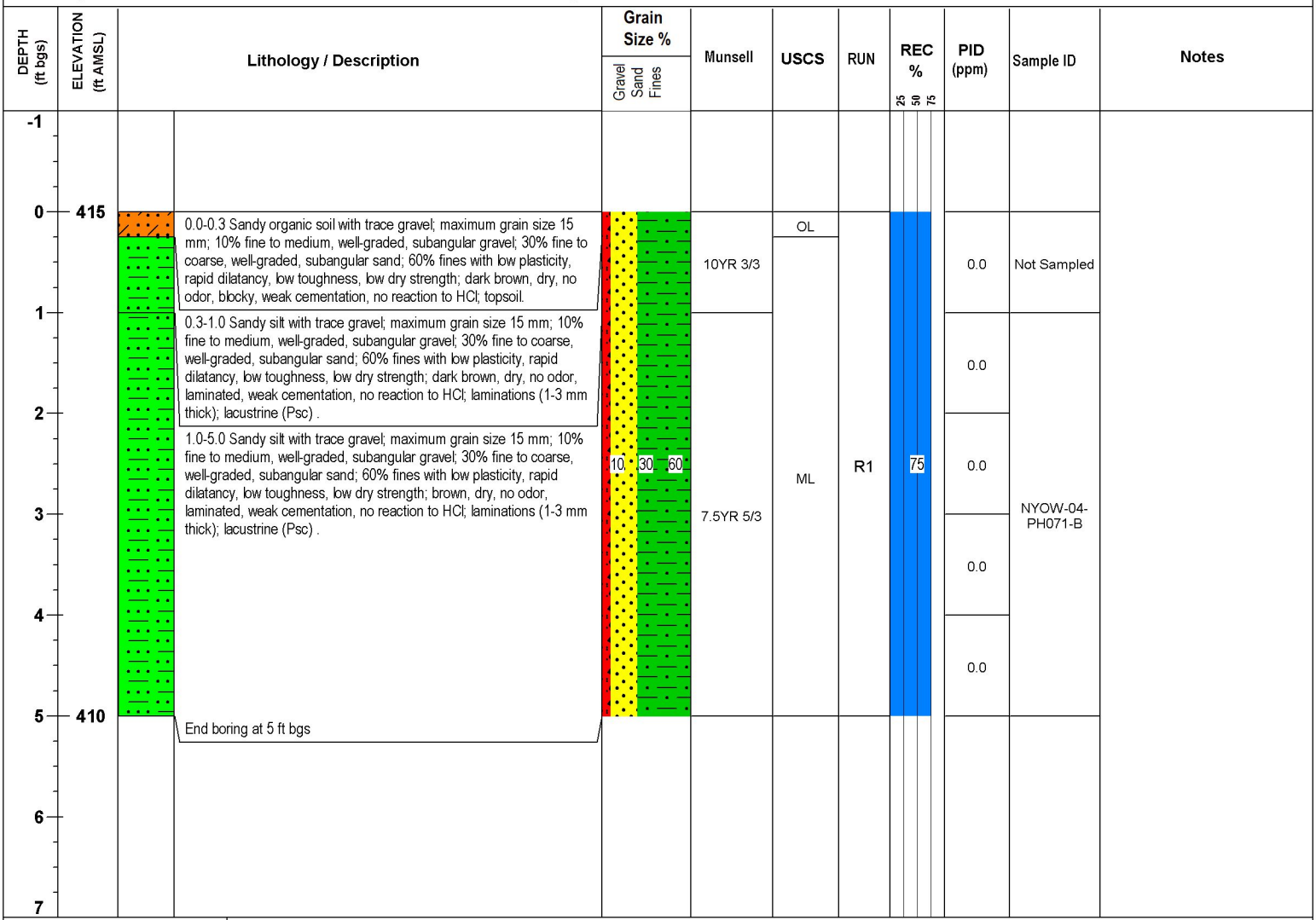
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166474.153, E 892842.401	**Surface Elevation:** 415 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-072
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

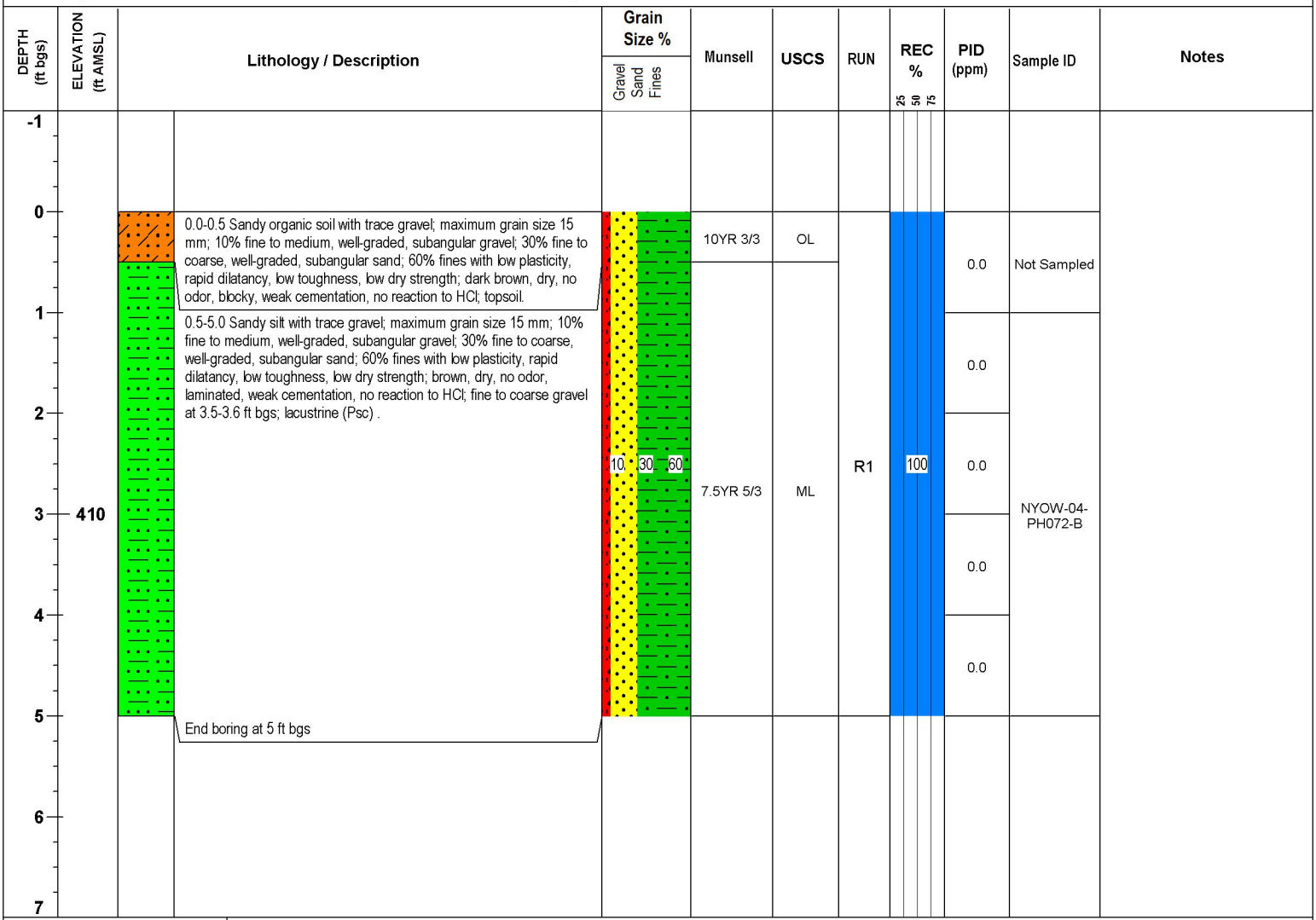
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166369.219, E 892931.534	**Surface Elevation:** 413 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

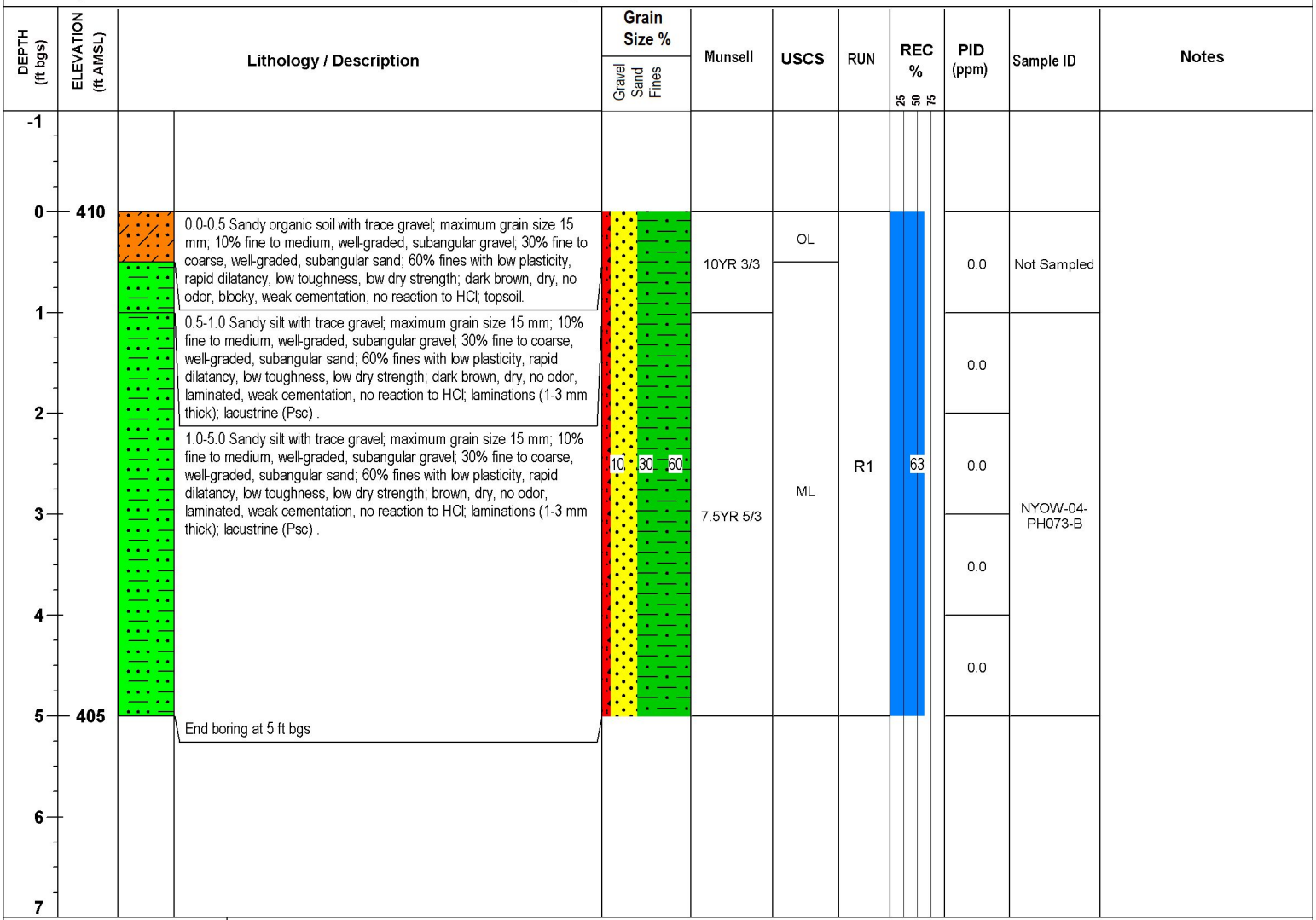
Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-073
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166242.749, E 893039.059	**Surface Elevation:** 410 ft AMSL
Start Date: 1/26/2021 — **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-074
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166168.134, E 893062.531	**Surface Elevation:** 412 ft AMSL
Start Date: 2/3/2021 **End Date:** 2/3/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	412	0.0-0.3 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, moist, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL	R1	55	0.0	Not Sampled	
1		0.3-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel at 3.75 & 4.75 ft bgs; lacustrine (Psc) .						0.0		
2	410		10 / 30 / 60	7.5YR 4/3	ML			0.0	NYOW-04-PH074-B	
3								0.0		
4								0.0		
5		End boring at 5 ft bgs								
6										
7	405									

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-075
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Bunker Discharge	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166148.701, E 893075.23	**Surface Elevation:** 411 ft AMSL
Start Date: 2/3/2021 — **End Date:** 2/3/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel — Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-076
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166109.16, E 893150.797	**Surface Elevation:** 410 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.5 Sandy organic soil with trace gravel, maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	10 / 30 / 60	7.5YR 5/3	OL	R1	100	0.0	Not Sampled	
1		0.5-4.0 Gravelly silt with little sand; maximum grain size 20 mm; 30% fine, poorly-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)						0.0		
2			30 / 15 / 55		ML			0.0	NYOW-04-PH076-B	
3								0.0		
4		4.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60					0.0		
5	405	End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-077
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/3/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1165990.394, E 893247.558	**Surface Elevation:** 409 ft AMSL
Start Date: 1/26/2021 — **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-1.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0	NYOW-04-PH077-B	
2		1.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .	10 / 30 / 60	7.5YR 5/3	ML	R1	75	0.0		
3								0.0		
4	405							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-078
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/3/21

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 4 Swale	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1165871.967, E 893347.448	**Surface Elevation:** 409 ft AMSL
Start Date: 1/26/2021 **End Date:** 1/26/2021	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 2.5 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	410	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	Not Sampled	
1		0.5-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, dry from 0.5 to 1.5 ft bgs, wet from 2.5 to 3.5 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
2			10 / 30 / 60	7.5YR 5/3	ML	R1	79	0.0	NYOW-04-PH078-B	
3								0.0		
4	405							0.0		
5		End boring at 5 ft bgs								
6										
7										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Borings were completed by advancing 4-foot MacroCore to 5 ft bgs. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-079

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC-4 Eastern Transect | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1168730.577, E 890998.252 | **Surface Elevation:** 409.339 ft AMSL

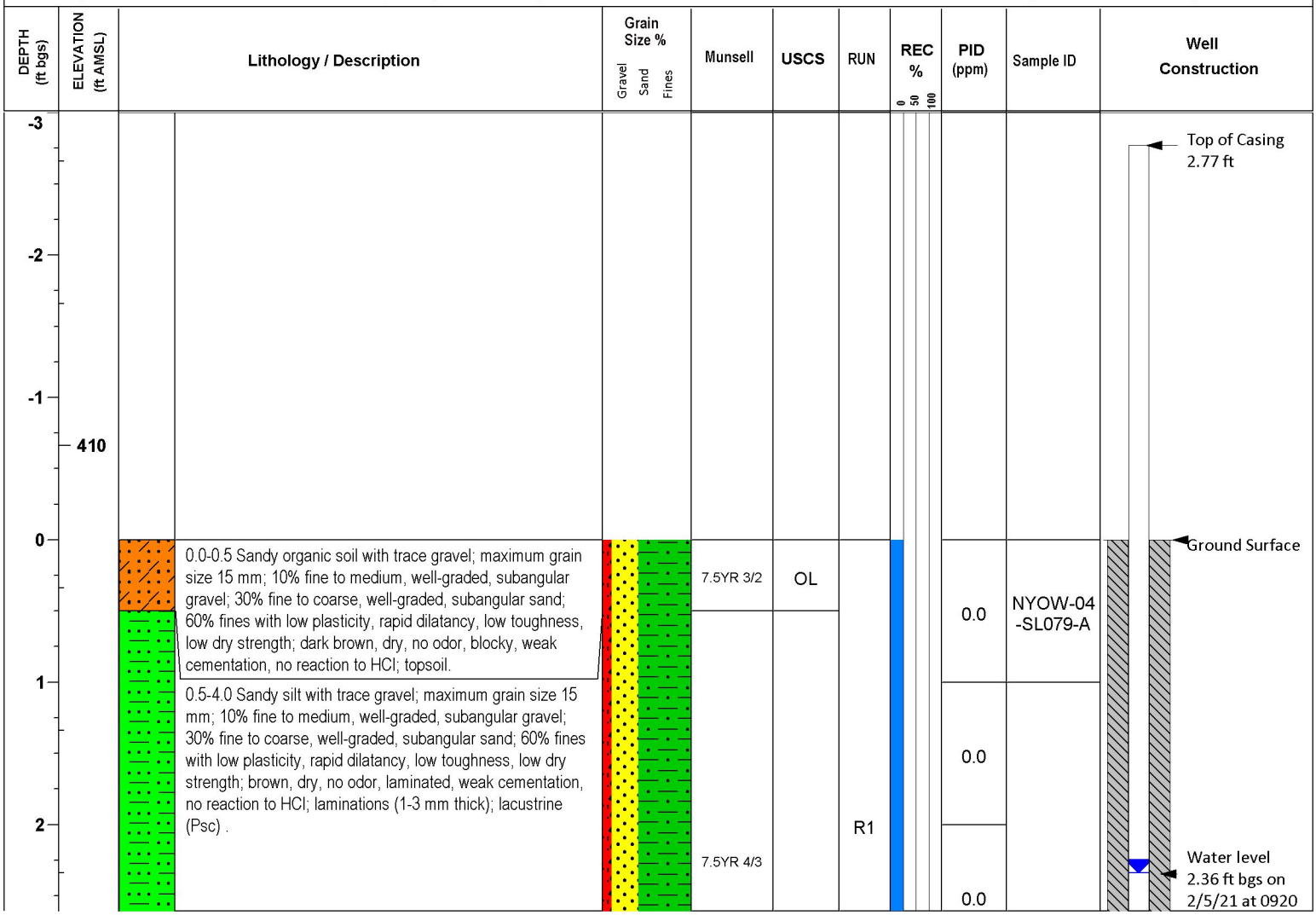
Start Date: 1/28/2021 | **End Date:** 1/28/2021 | **Casing Elevation:** 412.279 ft AMSL

Depth to Groundwater: 4 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 19.8 ft bgs

Depth to Water and Elapse Time After Drilling: 5.13 ft btoc on 2/5/21 at 0920

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 9.8 to 19.8 ft bgs; 2.77 ft Stick-up



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.13 ft btoc = 2.36 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-079

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3									NYOW-04-PH079-B	
4	405	4.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; yellowish brown / moderate yellowish brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)	10 / 30 / 60	10YR 5/4	ML			0.0		1" PVC; Bentonite Seal; Wet at 4 to 5 ft bgs
5		5.0-6.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)						0.0		
6						R2		0.0		
7		6.5-10.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)		7.5YR 4/3				0.0	NYOW-04-PH079-C	
8								0.0		
9	400							0.0		
10		10.0-12.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subangular gravel; 15% fine to coarse, well-graded, subangular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel at 10.25 ft bgs; stratified sediments (Ps)				R3		0.0		
11			30 / 15 / 55					0.0		

Grain Size Legend

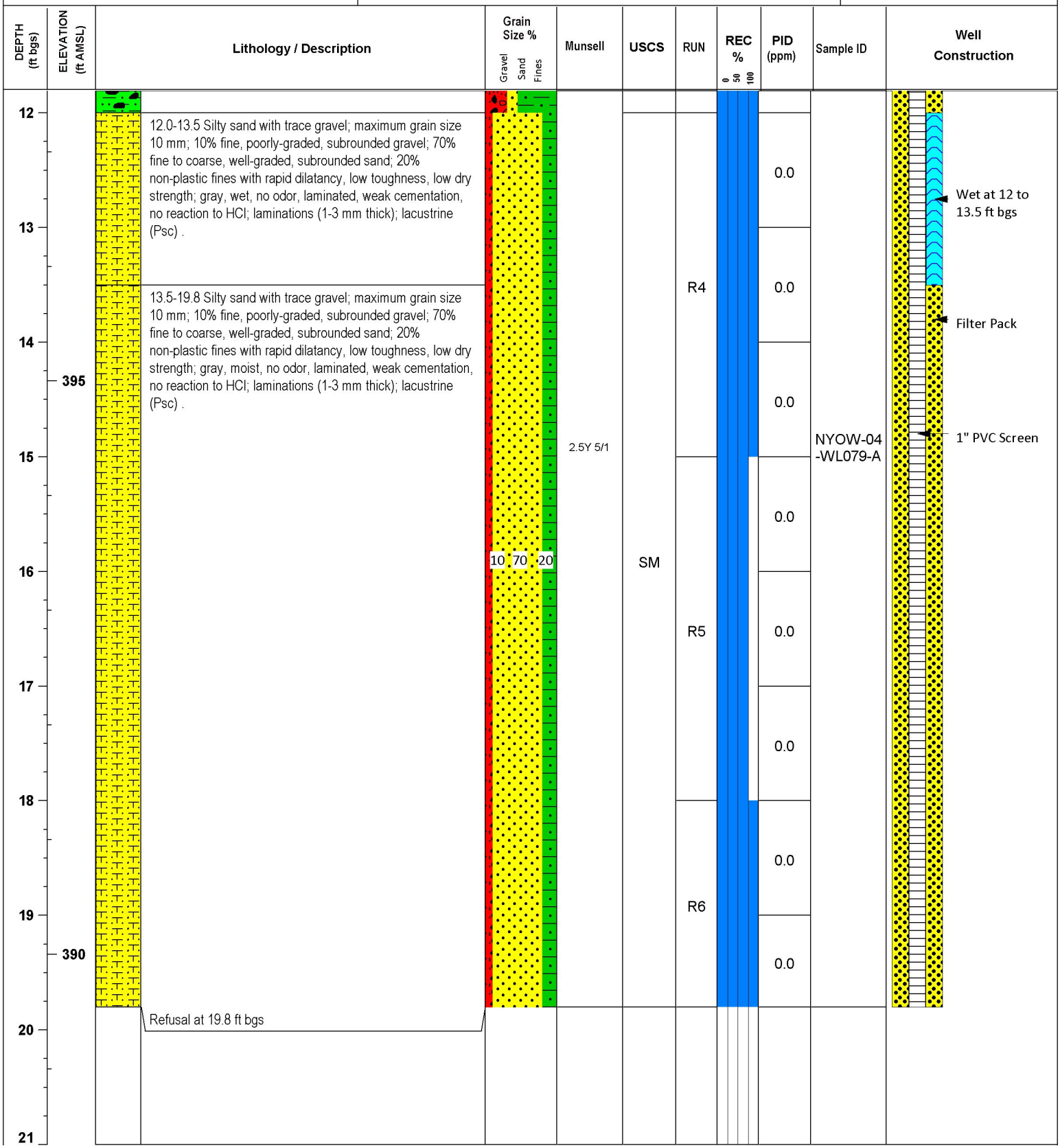
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.13 ft btoc = 2.36 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-079

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.13 ft btoc = 2.36 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-080

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC-4 Eastern Transect | **Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1168018.074, E 891596.112 | **Surface Elevation:** 414.263 ft AMSL

Start Date: 2/2/2021 | **End Date:** 2/2/2021 | **Casing Elevation:** 417.203 ft AMSL

Depth to Groundwater: 14 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 15 ft bgs

Depth to Water and Elapse Time After Drilling: 5.07 ft btoc on 2/5/21 at 0925

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 5 to 15 ft bgs; 2.7 ft Stick-up

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 / 50 / 100)	PID (ppm)	Sample ID	Well Construction
-3										Top of Casing 2.7 ft
-2										
-1	415									
0		0.0-2.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/2	OL	R1		0.0	NYOW-04-SL080-A	Ground Surface
1								0.0		1" PVC; Bentonite Seal
2								0.0		Water level 2.37 ft bgs on 2/5/21 at 0925

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.07 ft btoc = 2.37 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-080

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3		2.5-6.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)							NYOW-04-PH080-B	
4	410		10 / 30 / 60	7.5YR 4/3				0.0		
5								0.0		
6						R2		0.0		
7		6.0-9.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)						0.0	NYOW-04-PH080-C	
8					ML			0.0		
9	405	9.0-14.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel throughout; stratified sediments (Ps)				R3		0.0		Filter Pack
10								0.0		1" PVC Screen
11			30 / 15 / 55	2.5Y 5/1				0.0		

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.07 ft btoc = 2.37 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-080

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 50 100)	PID (ppm)	Sample ID	Well Construction
12						R4		0.0	NYOW-04-WL080-A	
13								0.0		
14	400	14.0-15.0 Poorly-graded gravel with little sand and trace silt; maximum grain size 20 mm; 75% fine, poorly-graded, angular gravel; 20% fine to coarse, well-graded, angular sand; 5% non-plastic fines with rapid dilatancy, low toughness, no dry strength; bluish black, wet, no odor, laminated, weak cementation, no reaction to HCl; refusal due to shale; stratified sediments (Ps)	75 / 20 / 5	10B 2.5/1	GP	R5		0.0		Wet at 14 to 15 ft bgs
15		Refusal at 15 ft bgs								
16										
17										
18										
19	395									
20										
21										

Grain Size Legend

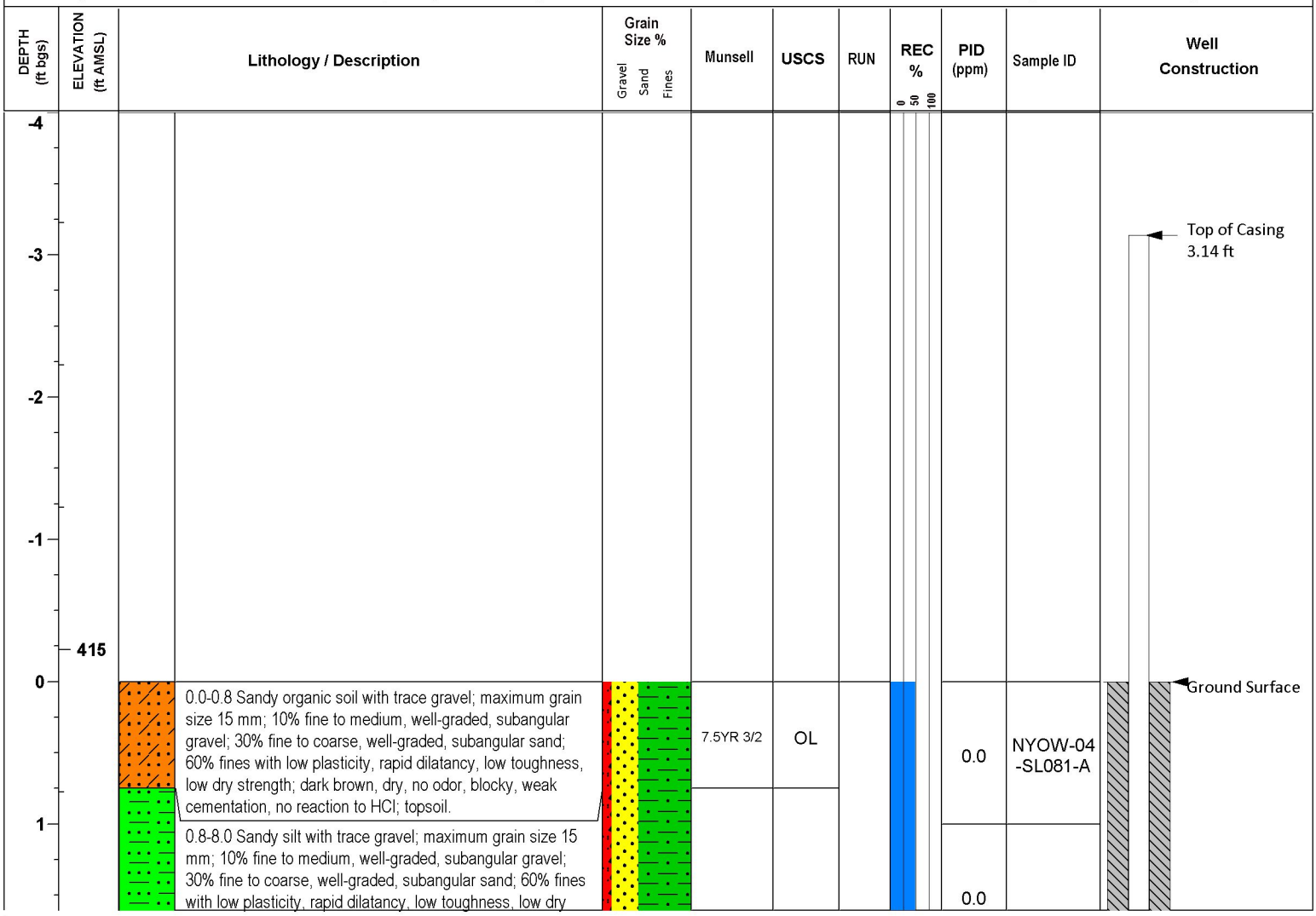
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.07 ft btoc = 2.37 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-081
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Eastern Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167698.190, E 891877.609		**Surface Elevation:** 414.775 ft AMSL
Start Date: 1/28/2021	**End Date:** 1/28/2021	**Casing Elevation:** 418.005 ft AMSL
Depth to Groundwater: 3 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft / **Total Depth:** 18.5 ft bgs
Depth to Water and Elapse Time After Drilling: 5.19 ft btoc on 2/5/21 at 0930		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 8.5 to 18.5 ft bgs; 3.14 ft Stick-up		



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.19 ft btoc = 2.05 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-081

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
2		strength; brown, dry at 0.75 to 3 and 3.25 to 4.75 ft bgs, wet at 3 to 3.25, 4.75 to 5, and 5.5 to 6 ft bgs, moist at 5 to 5.5 and 6 to 8 ft bgs, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).				R1		0.0		Water level 2.05 ft bgs on 2/5/21 at 0930
3								0.0	NYOW-04-PH081-B	1" PVC Wet at 3 to 3.25 ft bgs Bentonite Seal
4			10 / 30 / 60		ML			0.0		
5	410			7.5YR 4/3				0.0		Wet at 4.75 to 5 ft bgs
6						R2		0.0		Wet at 5.5 to 6 ft bgs
7								0.0	NYOW-04-PH081-C	
8		8.0-10.0 Silty sand with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subrounded gravel; 70% fine to coarse, well-graded, subrounded sand; 20% non-plastic fines with rapid dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
9			10 / 70 / 20		SM	R3		0.0		Wet at 8 to 10 ft bgs
10	405	10.0-12.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak						0.0		

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.19 ft btoc = 2.05 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-081

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
11		cementation, no reaction to HCl; Wet at 11 ft bgs; lacustrine (Psc)	10 / 30 / 60		ML			0.0		Wet at 11 ft bgs
12		12.0-15.0 Silty gravel with little sand; maximum grain size 30 mm; 50% fine to coarse, well-graded, angular gravel; 25% fine to coarse, well-graded, angular sand; 25% non-plastic fines with rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)				R4		0.0		Filter Pack
13			50 / 25 / 25		GM			0.0		1" PVC Screen
14									NYOW-04-WL081-A	
	400							0.0		
15		15.0-18.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine, poorly-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel at 16 ft bgs and coarse gravel at 17 ft bgs; refusal at black shale; lacustrine (Psc)		2.5Y 5/1				0.0		
16						R5				
17			10 / 30 / 60		ML			0.0		
18						R6		0.0		
		Refusal at 18.5 ft bgs								
19										
	395									
20										

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.19 ft btoc = 2.05 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-082
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21

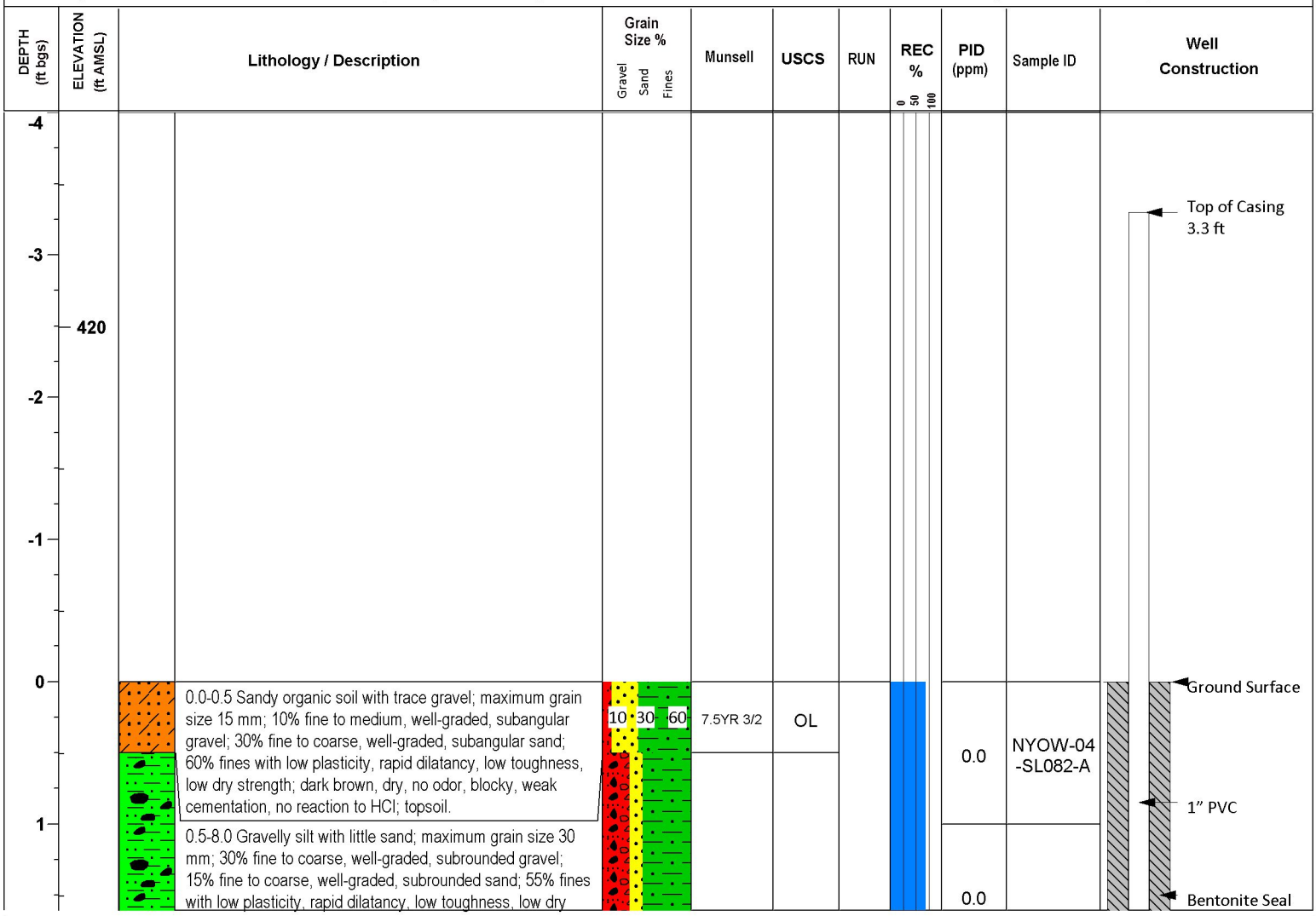
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Eastern Transect	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1167268.005, E 892213.767	**Surface Elevation:** 417.508 ft AMSL
Start Date: 2/2/2021 **End Date:** 2/2/2021	**Casing Elevation:** 420.343 ft AMSL

Depth to Groundwater: Dry ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 15 ft bgs

Depth to Water and Elapse Time After Drilling: 8.03 ft btoc on 2/5/21 at 0933

Other Water Level Measurements: Dry during drilling

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 5 to 15 ft bgs; 3.3 ft Stick-up



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 8.03 ft btoc = 4.73 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-082

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
2		strength; strong brown, dry, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel throughout; stratified sediments (Ps)				R1		0.0		
	415									
3								0.0	NYOW-04-PH082-B	
4			30 / 15 / 55	7.5YR 4/6				0.0		Water level 4.73 ft bgs on 2/5/21 at 0933
5								0.0		
6						R2		0.0		
7								0.0		
	410									
8		8.0-10.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)			ML			0.0	NYOW-04-PH082-C	
9			10 / 30 / 60	7.5YR 4/3				0.0		Filter Pack
10						R3		0.0		1" PVC Screen
		10.5-15.0 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, subrounded gravel;								

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 8.03 ft btoc = 4.73 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-082

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 50 100)	PID (ppm)	Sample ID	Well Construction
11		15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; pinkish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; fine to coarse gravel throughout; stratified sediments (Ps)						0.0		
12	405		30 / 15 / 55	7.5YR 6/2				0.0	NYOW-04-WL082-A	
13						R4		0.0		
14								0.0		
15		Refusal at 15 ft bgs								
16										
17										
18	400									
19										
20										

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 8.03 ft btoc = 4.73 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-083
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Eastern Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166989.159, E 892476.400		**Surface Elevation:** 415.719 ft AMSL
Start Date: 1/27/2021	**End Date:** 1/27/2021	**Casing Elevation:** 419.139 ft AMSL
Depth to Groundwater: 4 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 20.5 ft bgs
Depth to Water and Elapse Time After Drilling: 5.88 ft btoc on 2/5/21 at 0940		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 10.5 to 20.5 ft bgs; 3.27 ft Stick-up		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 – 50 – 100)	PID (ppm)	Sample ID	Well Construction
0	415	0.0-0.5 Sandy organic soil with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; dark brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.		7.5YR 3/4	OL			0.0	NYOW-04-SL083-A	Top of Casing 3.27 ft; Ground Surface
1		0.5-4.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation,						0.0		

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.88 ft btoc = 2.61 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-083

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
2		no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R1		0.0		
3								0.0	NYOW-04 -PH083-B	
4		4.0-5.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .						0.0		
5			10 30 60	7.5YR 4/3				0.0		
	410	5.0-10.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc) .				R2		0.0		
6								0.0		
7								0.0	NYOW-04 -PH083-C	
8								0.0		
9					ML			0.0		
10		10.0-15.0 Gravelly silt with little sand; maximum grain size 10 mm; 30% fine, poorly-graded, subrounded gravel; 15% fine to coarse, well-graded, subrounded sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)				R3		0.0		
	405									
11										

Water level 2.61 ft bgs on 2/5/21 at 0940

1" PVC

Bentonite Seal

Wet at 4 to 5 ft bgs

Grain Size Legend

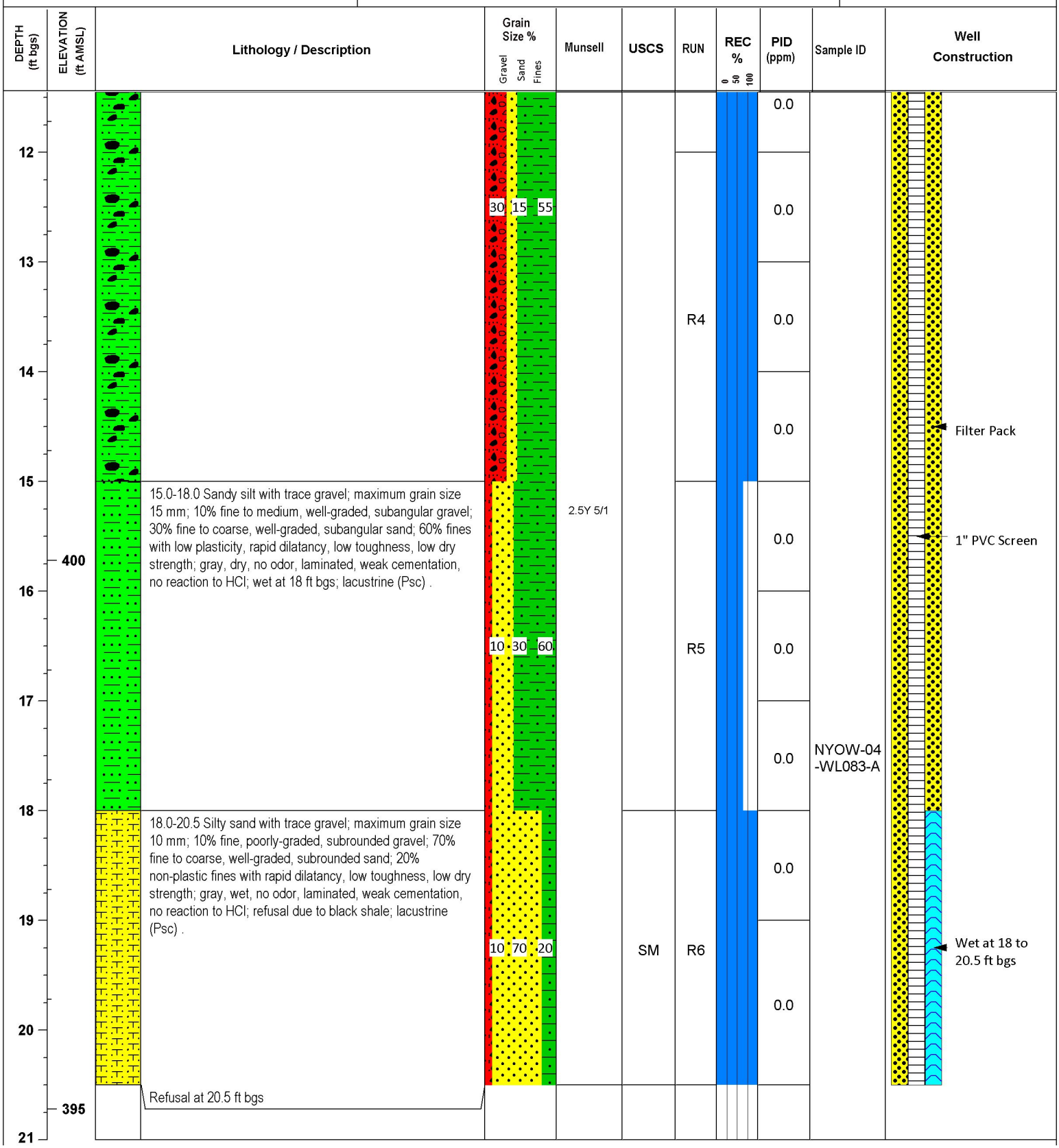
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.88 ft btoc = 2.61 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-083

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

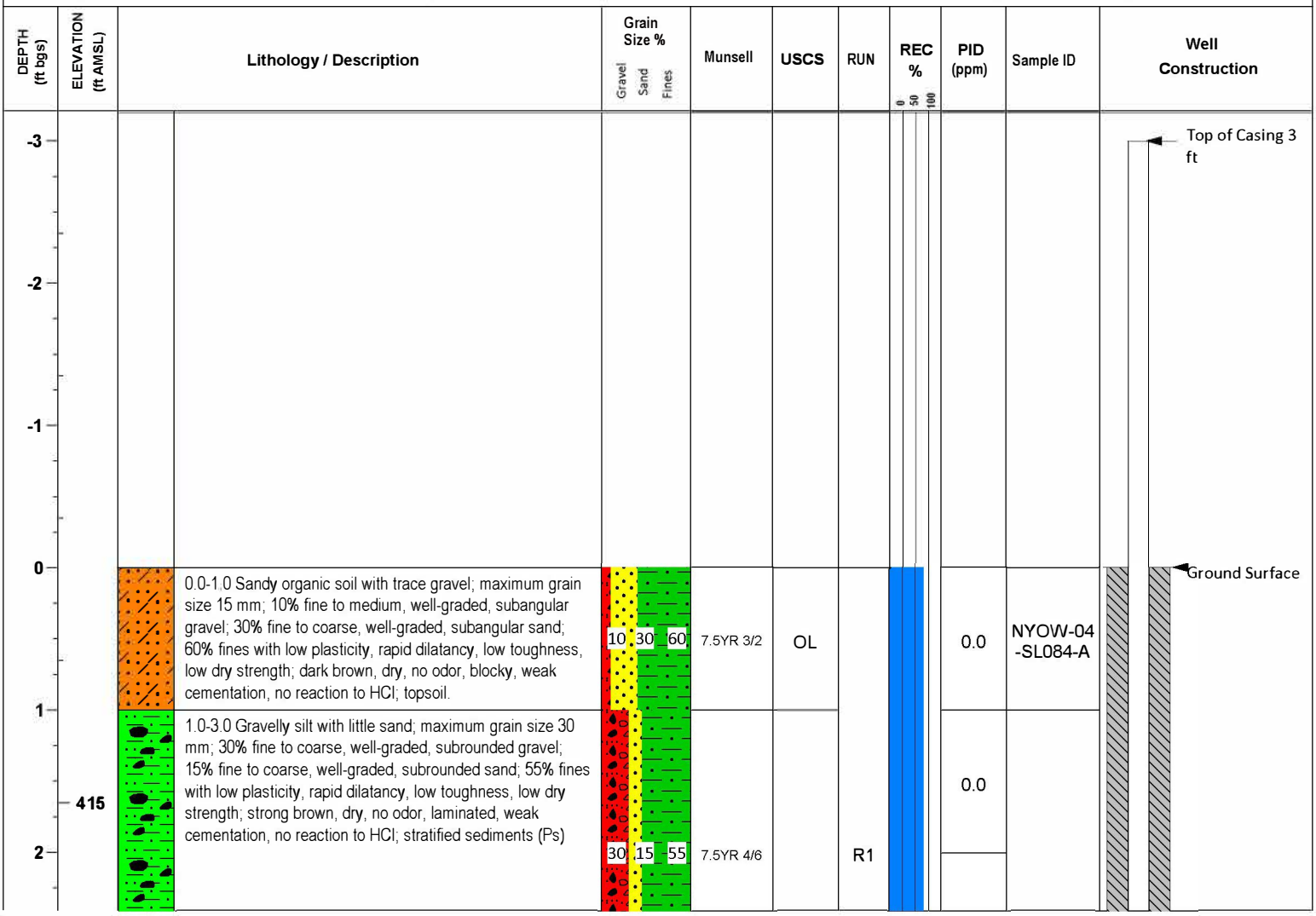
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.88 ft btoc = 2.61 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnance Works, Baldwinsville, NY		**Borehole ID:** NYOW-04-084
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Eastern Transect		**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166589.580, E 892804.167		**Surface Elevation:** 416.652 ft AMSL
Start Date: 2/3/2021	**End Date:** 2/3/2021	**Casing Elevation:** 419.807 ft AMSL
Depth to Groundwater: 11.5ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 19 ft bgs
Depth to Water and Elapse Time After Drilling: 6.93 ft btoc on 2/5/21 at 0945		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 9 to 19 ft bgs; 3 ft Stick-up		



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 6.93 ft btoc = 3.93 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-084

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3								0.0	NYOW-04-PH084-B	1" PVC
4		3.0-7.0 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)						0.0		Bentonite Seal Water level 3.93 ft bgs on 2/5/21 at 0945
5								0.0		
6	410		10 / 30 / 60	7.5YR 4/3	ML	R2		0.0		
7		7.0-8.5 Sandy silt with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subangular gravel; 30% fine to coarse, well-graded, subangular sand; 60% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc)						0.0	NYOW-04-PH084-C	
8								0.0		
9		8.5-11.5 Gravelly silt with little sand; maximum grain size 30 mm; 30% fine to coarse, well-graded, angular gravel; 15% fine to coarse, well-graded, angular sand; 55% fines with low plasticity, rapid dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)						0.0		
10			30 / 15 / 55	7.5YR 4/4		R3		0.0		
11								0.0		

Grain Size Legend

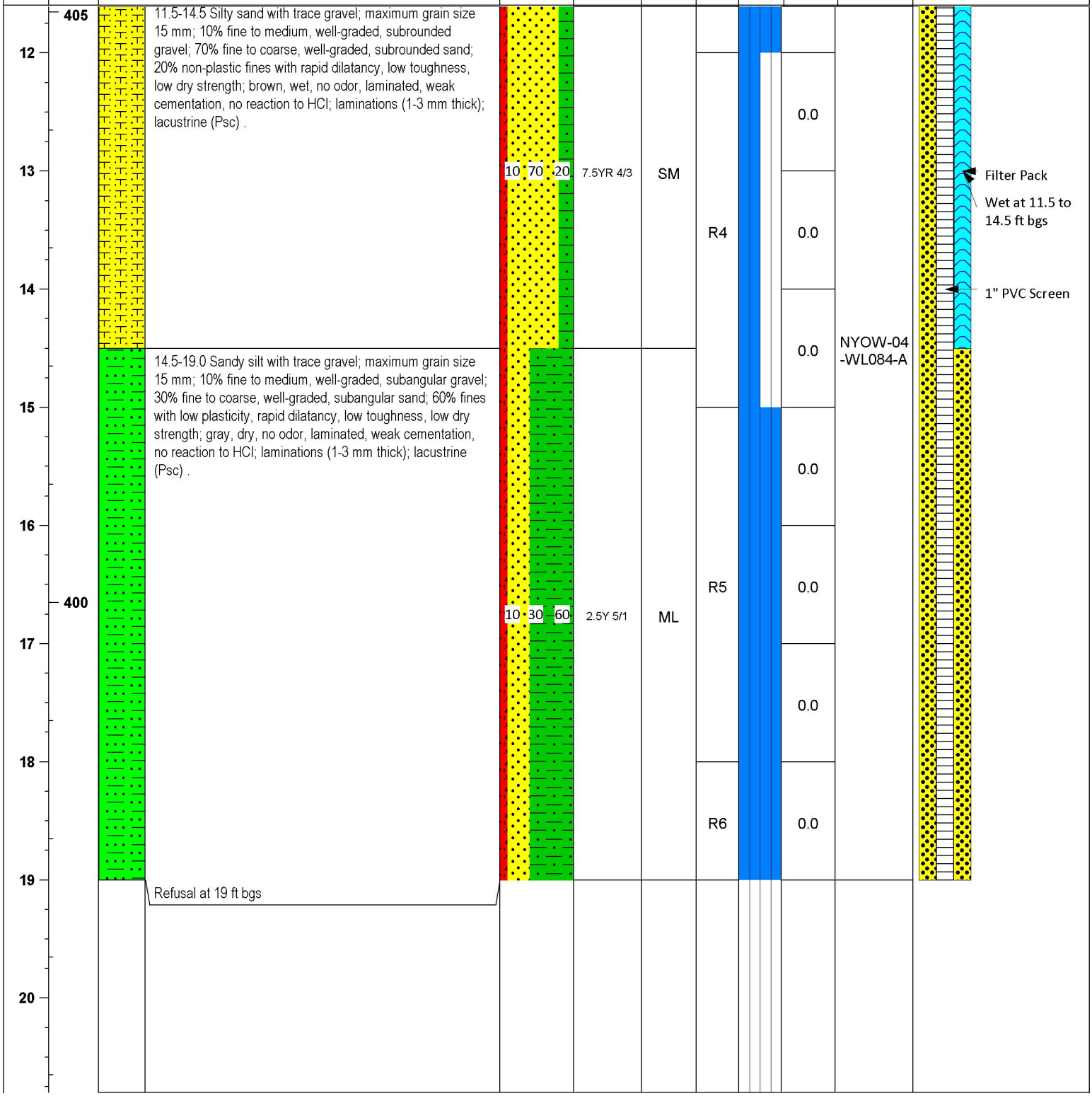
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 6.93 ft btoc = 3.93 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-084

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 6.93 ft btoc = 3.93 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

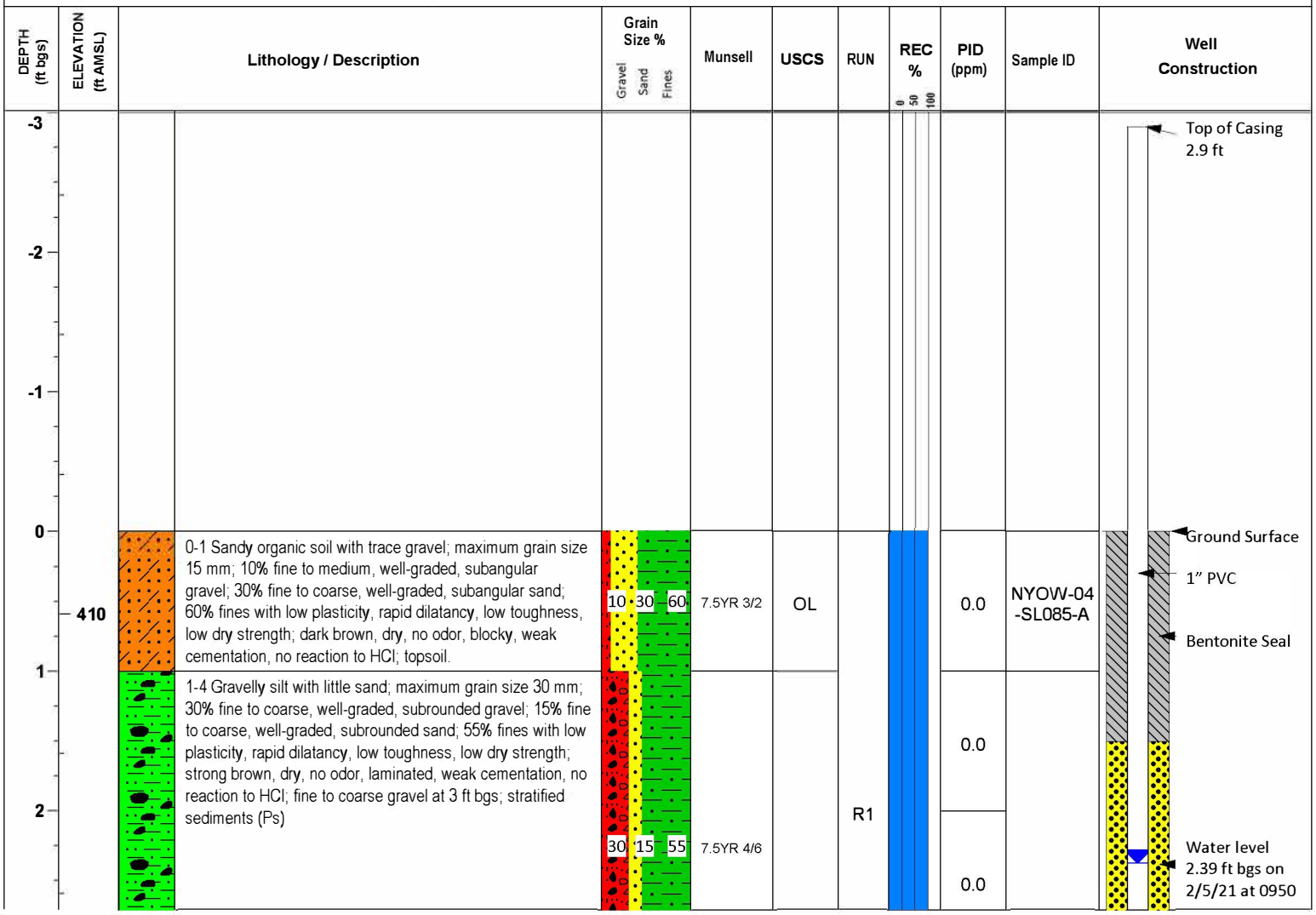
Project: Former NY Ordnance Works, Baldwinsville, NY	**Borehole ID:** NYOW-04-085
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/1/21
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC-4 Eastern Transect	**Drill Method:** DPT: 3-inch diameter, 4-foot long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1166197.746, E 893111.891	**Surface Elevation:** 410.591 ft AMSL
Start Date: 2/3/2021 — **End Date:** 2/3/2021	**Casing Elevation:** 413.701 ft AMSL

Depth to Groundwater: 3.5 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 10.5 ft bgs

Depth to Water and Elapse Time After Drilling: 5.29 ft btoc on 2/5/21 at 0950

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch Slotted Screen from 3.5 to 10.5 ft bgs; 2.9 ft Stick-up



Grain Size Legend

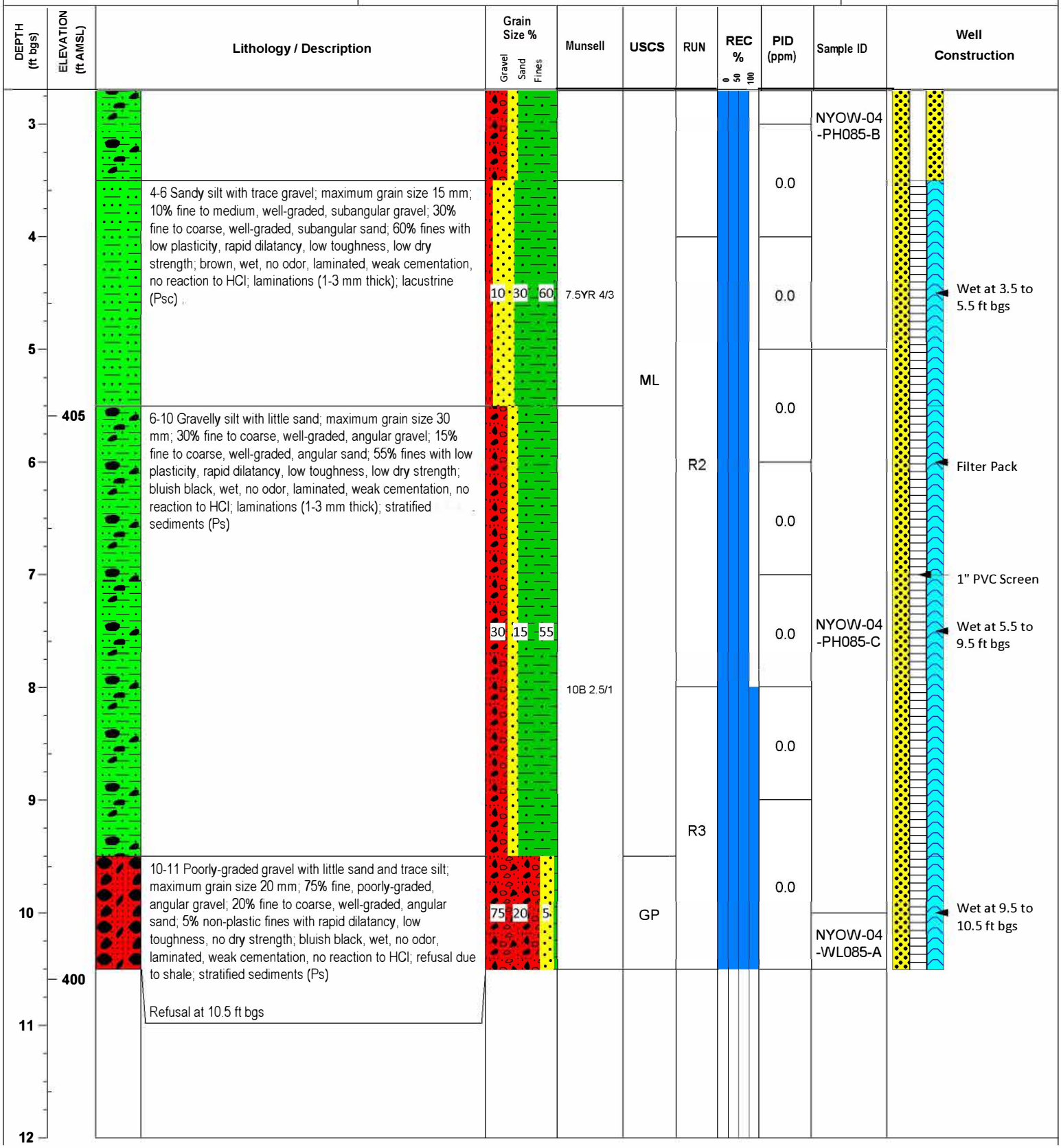
- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.29 ft btoc = 2.39 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnance Works, Baldwinsville, NY | **Borehole ID:** NYOW-04-085

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/1/21



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level (2/5/21) = 5.29 ft btoc = 2.39 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-001
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Possible Dump Area	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1157056.55, E 895143.73	**Surface Elevation:** 441.605 ft AMSL
Start Date: 1/12/21 **End Date:** 1/12/21	**Casing Elevation:** 443.105 ft AMSL

Depth to Groundwater: 19 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 21 ft bgs

Depth to Water and Elapsed Time After Drilling: 2.66 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 11 to 21 ft bgs

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
0	441.6	0.0-0.3 Sandy organic soil with some silt and trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OH			0.0	NYOW-05-SL001-A	Top of Casing 1.4 ft; Ground Surface
1	440	0.3-4.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 65 / 30	10YR 3/1		R1	33	0.0		
2								0.0		
3								0.0	NYOW-05-PH001-B	Water Level 2.66 ft bgs 1/16/21
								0.0		

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 4.06 ft btoc = 2.66 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-001

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
4		4.0-8.0 Silty sand with little gravel; maximum grain size 33 mm; 20% fine to coarse, well-graded, subangular gravel; 60% fine to coarse, well-graded, subangular sand; 20% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).			SM			0.0		Bentonite Seal
5								0.0		1" PVC
6			20 60 20	7.5YR 5/1		R2	80	0.0		
	435							0.0		
7								0.0	NYOW-05-PH001-C	
8		8.0-12.0 Silt with trace gravel and sand; maximum grain size 7 mm; 5% fine, poorly-graded, rounded gravel; 10% fine to coarse, well-graded, rounded sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; medium dark gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		
9								0.0		
10			5 10 85	N4	ML	R3	100	0.0		
11								0.0		
	430							0.0		
12		12.0-15.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 4.06 ft btoc = 2.66 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-001

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
13										
14			5 65 30	10YR 3/1	SM	R4	100	0.0		
								0.0		
15		15.0-18.0 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		Filter Pack
16			5 5 90	7.5YR 5/1	MH	R5	100	0.0		1" PVC Screen from 11 to 21 ft bgs
	425							0.0	NYOW-05-WL001-A	
17								0.0		
18		18.0-21.0 Silt with trace gravel and sand; maximum grain size 10 mm; 5% fine, poorly-graded, rounded gravel; 10% fine to coarse, well-graded, rounded sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; medium dark gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		
19			5 10 85	N4	ML	R6	67	0.0		Wet at 19 ft bgs
20								0.0		
21		Refusal at 21 ft bgs								
	420									
22										

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 4.06 ft btoc = 2.66 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY	**Borehole ID:** NYOW-05-002
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056
Date: 3/8/21 (Revised)	
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Possible Dump Area	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1157015.69, E 895122.82	**Surface Elevation:** 439 ft AMSL
Start Date: 1/12/21 **End Date:** 1/12/21	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs
Depth Drilled into Rock: n/a ft	**Total Depth:** 10 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-1.0 Sandy organic soil with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; very dark grayish brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OL			0.0	NYOW-05-SL002-A	
1								0.0		
2		1.0-4.0 Well-graded sand with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; very dark grayish brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	40 / 50 / 10	10YR 3/2	SW-SM	R1	25	0.0	NYOW-05-PH002-B	
3								0.0		
4	435							0.0		
5		4.0-8.0 Silty sand with little gravel; maximum grain size 33 mm; 20% fine to coarse, well-graded, subangular gravel; 60% fine to coarse, well-graded, subangular sand; 20% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)						0.0		
6			20 / 60 / 20		SM	R2	13	0.0		
7				7.5YR 5/1				0.0	NYOW-05-PH002-C	
8		8.0-10.0 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		
9	430		5 / 5 / 90		MH	R3	75	0.0		
10		End boring at 10 ft bgs								
11										
12										

Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY	**Borehole ID:** NYOW-05-003
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056 — **Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Possible Dump Area	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1157022.16, E 895158.7	**Surface Elevation:** 442 ft AMSL
Start Date: 1/12/21 — **End Date:** 1/12/21	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs — **Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 10 ft bgs	
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % Gravel	Sand	Fines	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-1.0 Sandy organic soil with some gravel, little silt, and trace clay; maximum grain size 21 mm; 41.9% fine to coarse, well-graded, angular gravel; 45.2% fine to coarse, well-graded, angular sand; 12.9% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; very dark grayish brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	42	45	13		OL			0.0	NYOW-05-SL016-A	
1										0.0		
2	440	1.0-4.0 Sandy silt with little clay; maximum grain size 5 mm; 32.7% fine to coarse, well-graded, angular sand; 67.3% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; very dark grayish brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).				10YR 3/2	ML	R1	75	0.0	NYOW-05-PH016-B	
3			0	33	67					0.0		
4		4.0-5.0 Sandy elastic silt with little clay; maximum grain size 5 mm; 32.7% fine to coarse, well-graded, rounded sand; 67.3% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).					MH			0.0		
5		5.0-8.0 Silty sand with little clay and trace gravel; maximum grain size 15 mm; 1.8% fine, poorly-graded, rounded gravel; 59% fine to coarse, well-graded, rounded sand; 39.2% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).								0.0	NYOW-05-PH016-C	
6						10YR 3/1		R2	100	0.0		
7	435		2	59	39		SM			0.0		
8		8.0-10.0 Silty sand with little clay and trace gravel; maximum grain size 33 mm; 1.8% fine to coarse, well-graded, subangular gravel; 59% fine to coarse, well-graded, subangular sand; 39.2% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).								0.0		
9						7.5YR 5/1		R3	100	0.0		
10		End boring at 10 ft bgs										
11												
12	430											

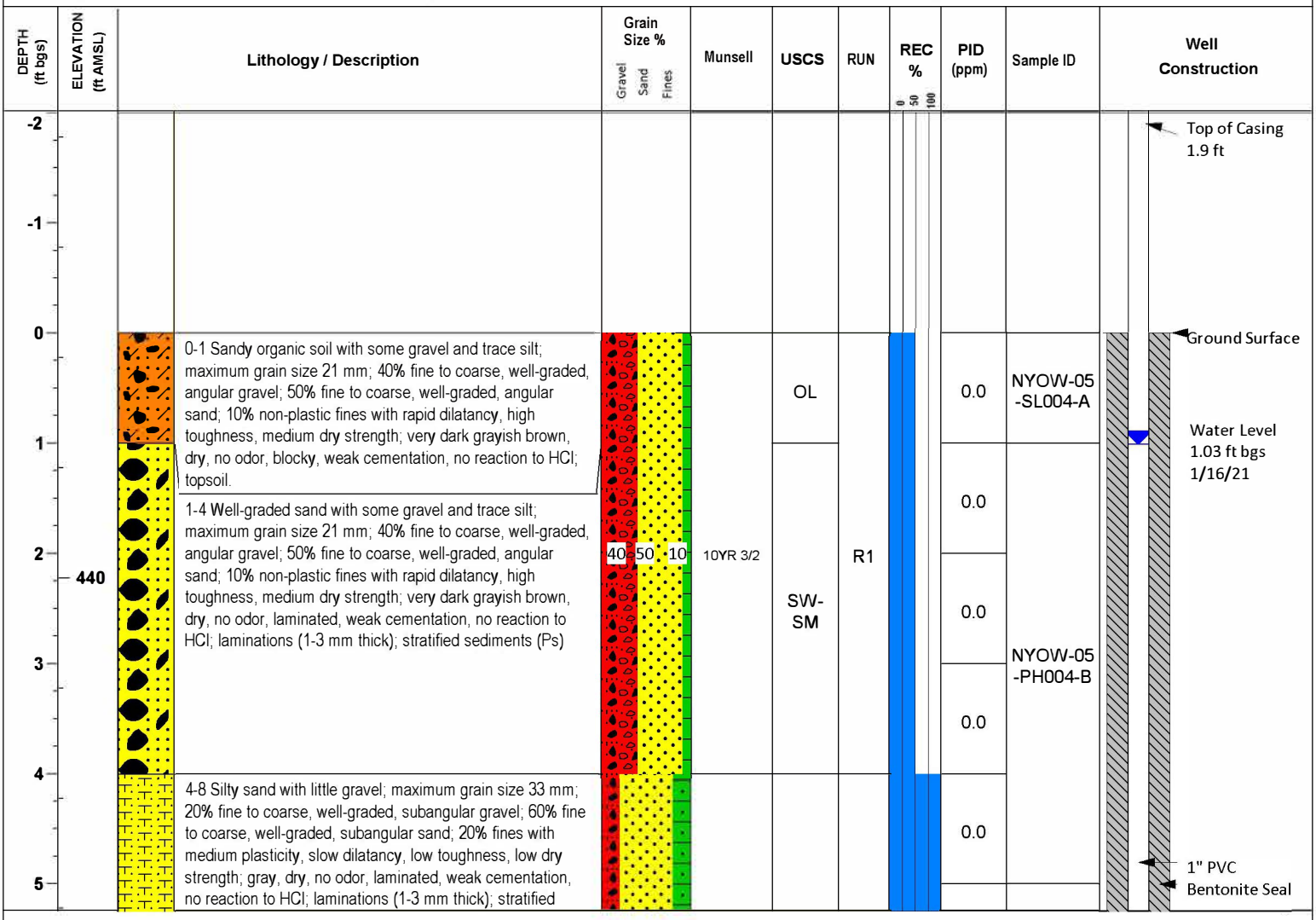
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-004
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Possible Dump Area		**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1157014.19, E 895196.56		**Surface Elevation:** 442.223 ft AMSL
Start Date: 1/12/21	**End Date:** 1/12/21	**Casing Elevation:** 444.163 ft AMSL
Depth to Groundwater: 11 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 22 ft bgs
Depth to Water and Elapse Time After Drilling: 1.03 ft bgs on 1/16/21		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 12 to 22 ft bgs		



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level on 1/16/21 = 2.93 ft btoc = 1.03 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-004

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
6		sediments (Ps)	20 / 60 / 20	7.5YR 5/1	SM	R2		0.0	NYOW-05-PH004-C	
7	435							0.0		
8		8-11 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		
9			5 / 65 / 30	10YR 3/1		R3		0.0		
10								0.0		
11		11-14 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		
12	430		5 / 5 / 90	7.5YR 5/1	MH	R4		0.0		
13								0.0		
14		14-18 Silt with trace gravel and sand; maximum grain size 8 mm; 5% fine, poorly-graded, rounded gravel; 10% fine to coarse, well-graded, rounded sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; medium dark gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		
15								0.0		
16			5 / 10 / 85	N4	ML	R5		0.0	NYOW-05-WL004-A	Filter Pack
17										1" PVC Screen from 12 to 22 ft

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level on 1/16/21 = 2.93 ft btoc = 1.03 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-004

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
18	425	18-22 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 65 / 30	10YR 3/1	SM	R6	0 50 100	0.0		bgs
19								0.0		
20								0.0		
21								0.0		
22		Refusal at 22 ft bgs						0.0		
23	420									
24										
25										
26										
27										
28	415									
29										

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level on 1/16/21 = 2.93 ft btoc = 1.03 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-005
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

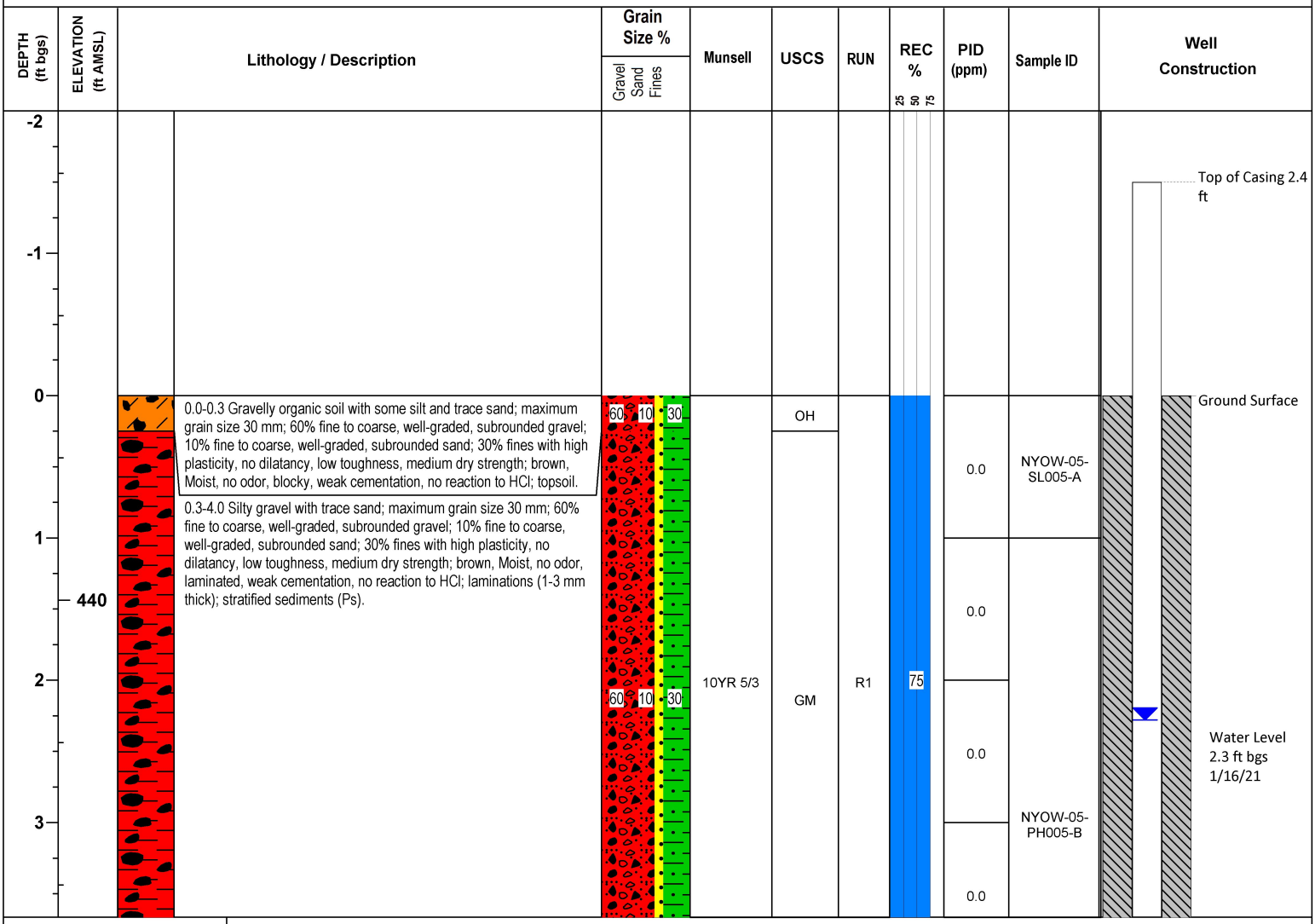
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Possible Dump Area	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156981.62, E 895155.26	**Surface Elevation:** 441.438 ft AMSL
Start Date: 1/12/21 **End Date:** 1/12/21	**Casing Elevation:** 443.018 ft AMSL

Depth to Groundwater: 4 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 21 ft bgs

Depth to Water and Elapsed Time After Drilling: 2.3 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from



Legend

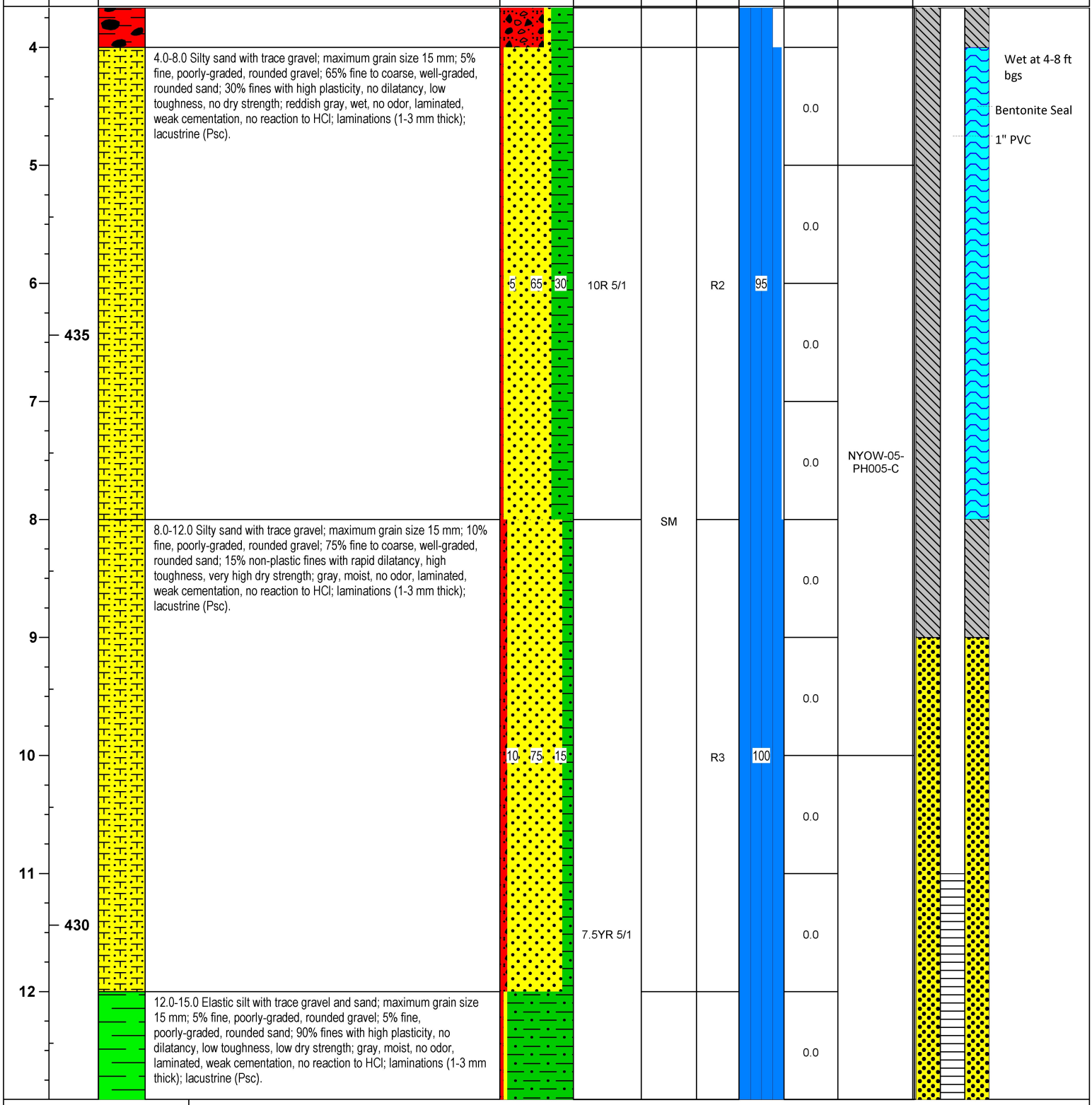
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 3.8 ft btoc = 2.3 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-005

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

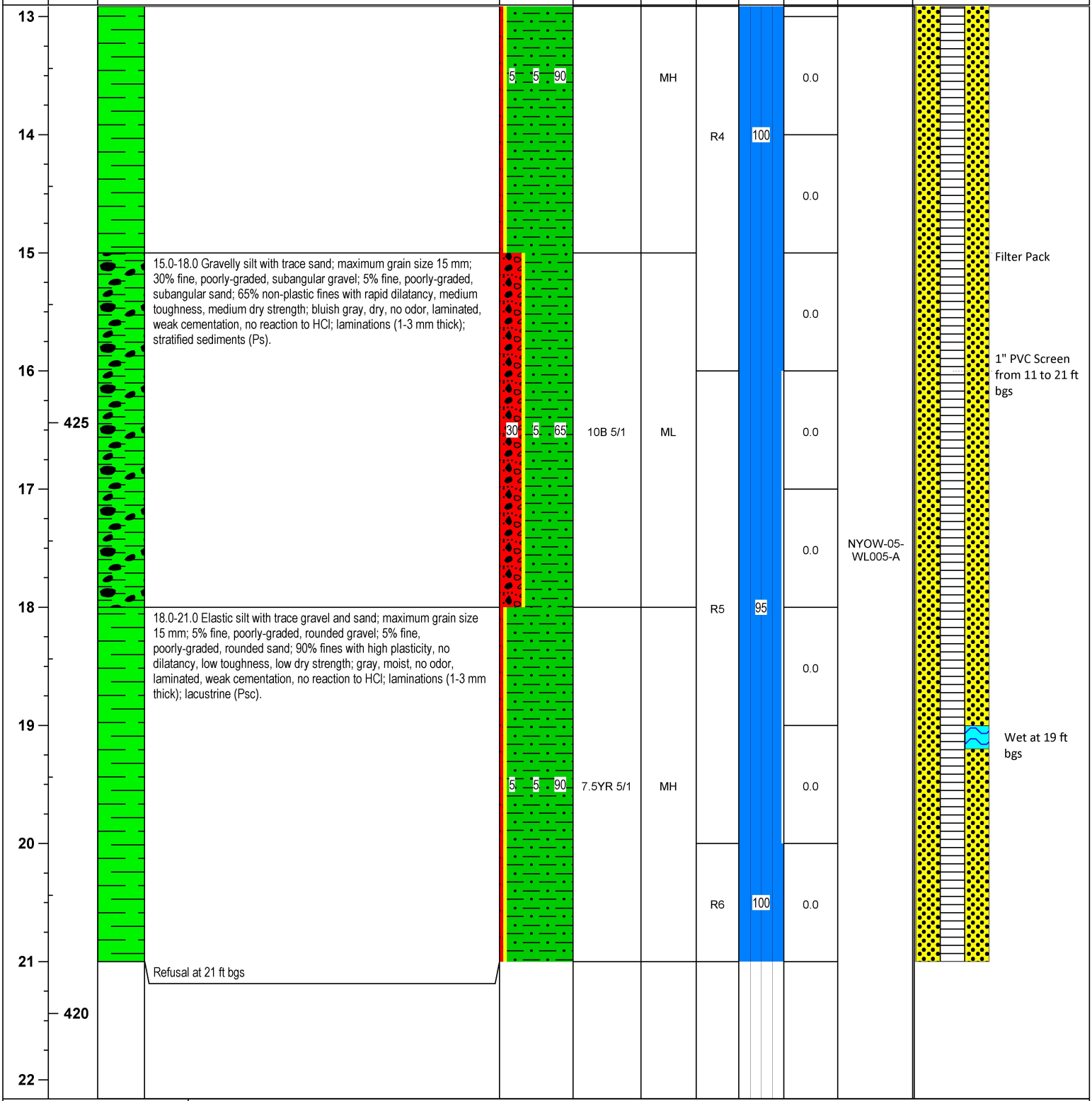
Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Water Level on 1/16/21 = 3.8 ft btoc = 2.3 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-005

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

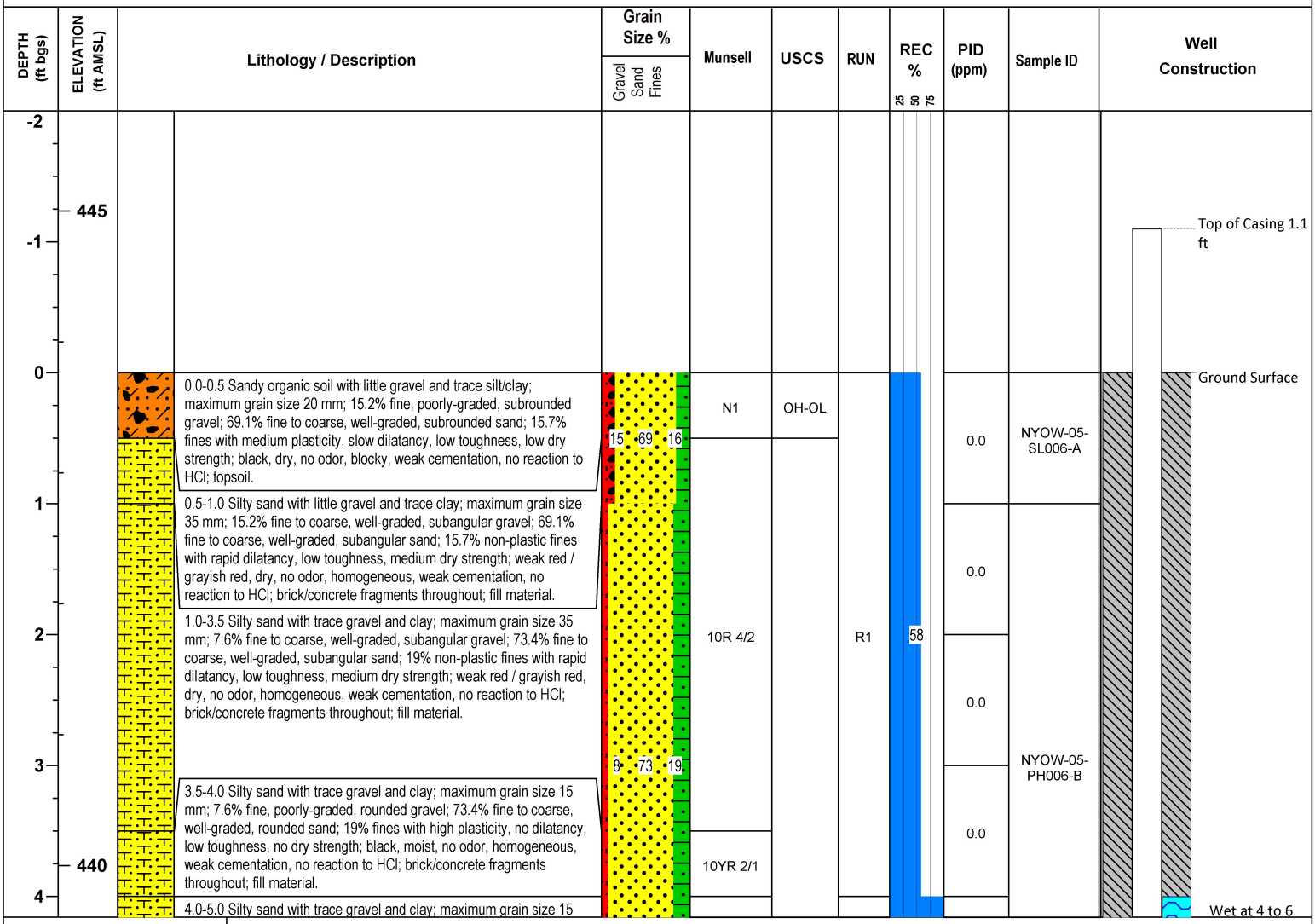
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 3.8 ft btoc = 2.3 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-006
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Storage Area		**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156788.35, E 895234.36		**Surface Elevation:** 443.764 ft AMSL
Start Date: 1/8/21	**End Date:** 1/8/21	**Casing Elevation:** 445.384 ft AMSL
Depth to Groundwater: 4 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft / **Total Depth:** 23 ft bgs
Depth to Water and Elapsed Time After Drilling: 4.78 ft bgs on 1/16/21		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 13 to 23 ft bgs		



Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water level on 1/16/21 = 5.88 ft btoc = 4.78 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-006

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
5		mm; 7.6% fine, poorly-graded, rounded gravel; 73.4% fine to coarse, well-graded, rounded sand; 19% fines with high plasticity, no dilatancy, low toughness, no dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).		10YR 5/1				0.0		Water Level 4.78 ft bgs 1/16/21
		5.0-6.0 Silty sand with trace gravel and clay; maximum grain size 15 mm; 14.3% fine, poorly-graded, rounded gravel; 48.4% fine to coarse, well-graded, rounded sand; 37.3% fines with high plasticity, no dilatancy, low toughness, no dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).		10YR 5/2	SM			0.0		Bentonite Seal
6		6.0-9.0 Silty sand with trace gravel and clay; maximum grain size 10 mm; 14.3% fine, poorly-graded, subangular gravel; 48.4% fine, poorly-graded, subangular sand; 37.3% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; orange redoximorphic laminations (<3 mm thick) throughout; stratified sediments (Ps).	14 48 37			R2	100	0.0		1" PVC
7								0.0		
								0.0	NYOW-05-PH006-C	
8								0.0		
	435							0.0		
9		9.0-10.0 Silty sand with trace gravel and clay; maximum grain size 15 mm; 14.3% fine, poorly-graded, rounded gravel; 48.4% fine, poorly-graded, rounded sand; 37.3% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).						0.0		
10		10.0-14.0 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, moist, no odor, homogeneous, weak cementation, no reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).		10YR 5/3		R3	100	0.0		
11								0.0		
12			5 5 90					0.0		
13					MH			0.0		
	430							0.0		
14		14.0-16.5 Gravelly Elastic silt with little gravel and trace sand;				R4	100			

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water level on 1/16/21 = 5.88 ft btoc = 4.78 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-006

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
15		maximum grain size 33 mm; 25% fine to coarse, well-graded, subangular gravel; 5% fine, poorly-graded, subangular sand; 70% fines with high plasticity, no dilatancy, low toughness, low dry strength; dark grayish brown / dark yellowish brown, moist, no odor, homogeneous, weak cementation, strong reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).	25 5 70	10YR 4/2				0.0		
								0.0		
16										
								0.0	NYOW-05-WL006-A	Wet at 16.5 to 23 ft bgs
17		16.5-23.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; gray, wet, no odor, homogeneous, weak cementation, no reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).						0.0		Filter Pack
								0.0		
18						R5	100			1" PVC Screen from 13 to 23 ft bgs
	425							0.0		
19								0.0		
			5 65 30	7.5YR 5/1	SM					
20								0.0		
21						R6	100			
								0.0		
22										
								0.0		
23		Refusal at 23 ft bgs								
	420									
24										

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water level on 1/16/21 = 5.88 ft btoc = 4.78 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-007

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 5 Coal Storage Area | **Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1156696.96, E 895234.35 | **Surface Elevation:** 442 ft AMSL

Start Date: 1/7/21 | **End Date:** 1/7/21 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 10 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.5 Sandy organic soil with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; black, dry, no odor, blocky, weak cementation, no reaction to HCl; coal dust; topsoil.	40 / 50 / 10	N1	OL	R1	65	0.0	NYOW-05-SL007-A	
1		0.5-1.5 Well-graded gravel with little sand and trace silt; maximum grain size 25 mm; 70% fine to coarse, well-graded, angular gravel; 25% fine to coarse, well-graded, angular sand; 5% non-plastic fines with rapid dilatancy, medium toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	70 / 25 / 5	7.5YR 5/3	GW			0.0		
2	440	1.5-1.9 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; black, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).		10YR 2/1				0.0		
		1.9-5.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; light yellowish brown, dry, no odor, laminated, weak cementation, no reaction to HCl; coarse gravel at 2.5 to 2.7 ft bgs; lacustrine (Psc).	5 / 65 / 30	10YR 6/4	SM			0.0	NYOW-05-PH007-B	
3										

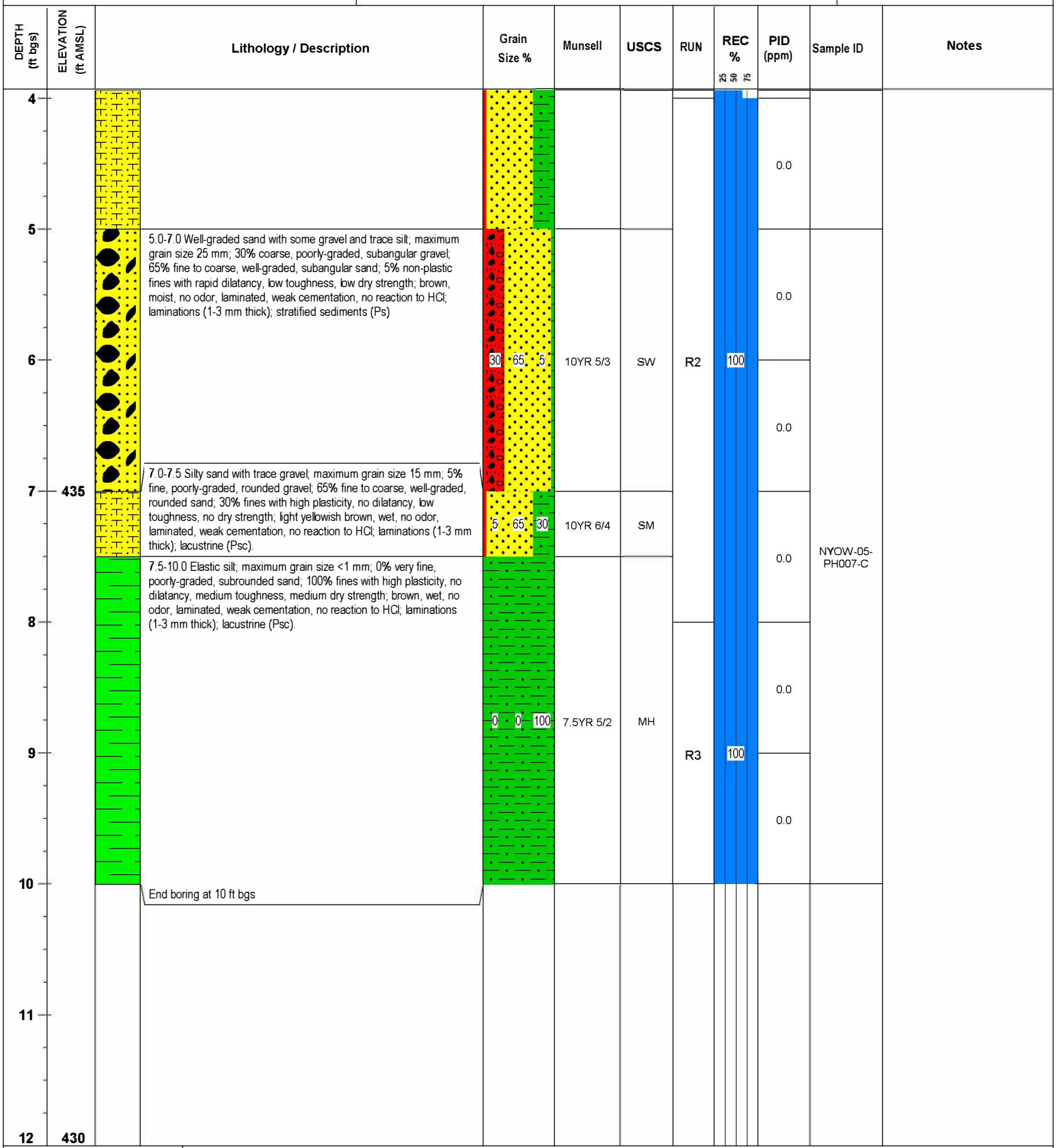
Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-007

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

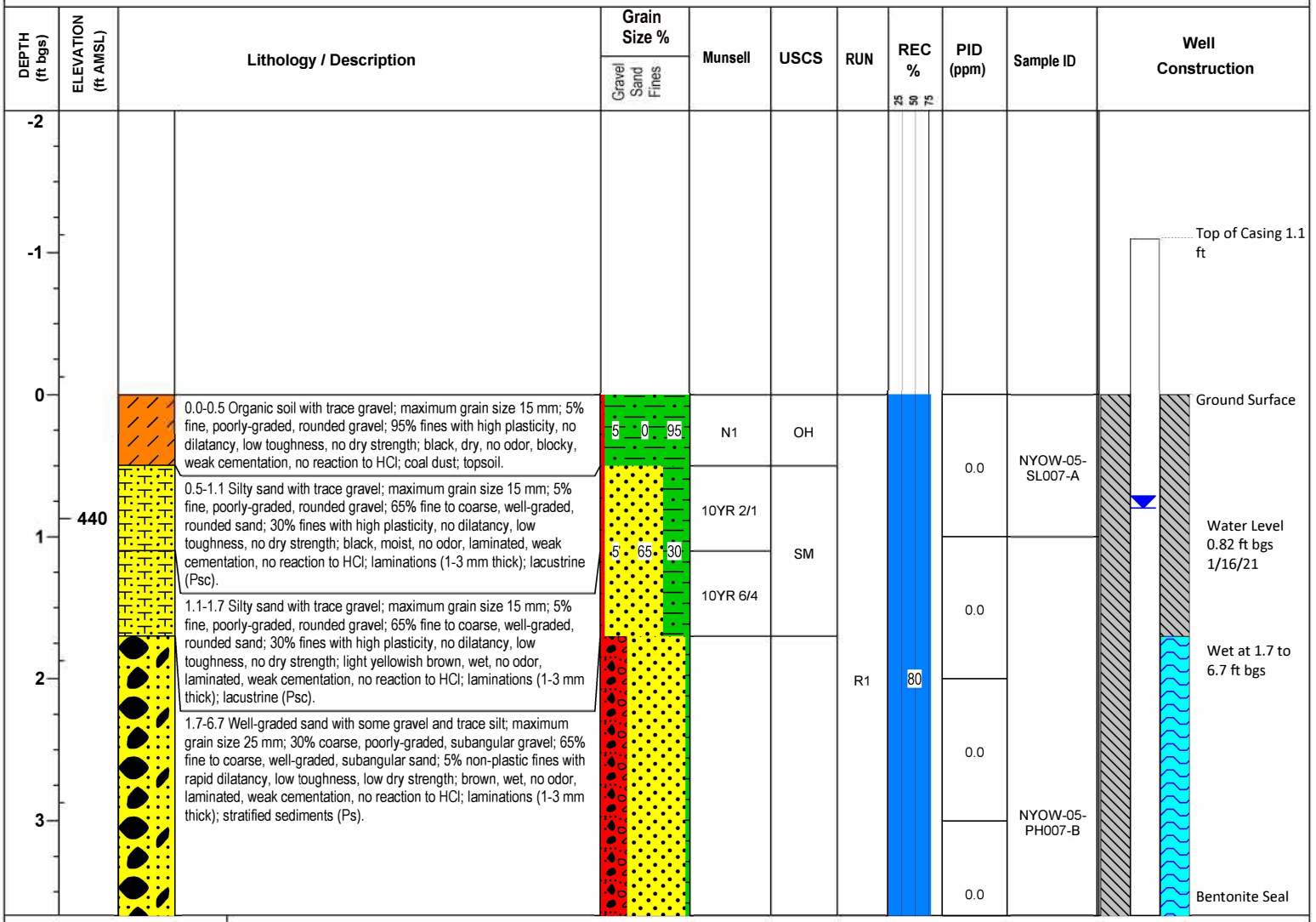
Gravel | Fines | Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-008
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Storage Area		**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156592.97, E 895226.89		**Surface Elevation:** 440.873 ft AMSL
Start Date: 1/7/21	**End Date:** 1/7/21	**Casing Elevation:** 441.978 ft AMSL
Depth to Groundwater: 1.7 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft / **Total Depth:** 19 ft bgs
Depth to Water and Elapsed Time After Drilling: 0.82 ft bgs on 1/16/21		
Other Water Level Measurements: n/a		
Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 9 to 19 ft bgs		



Legend

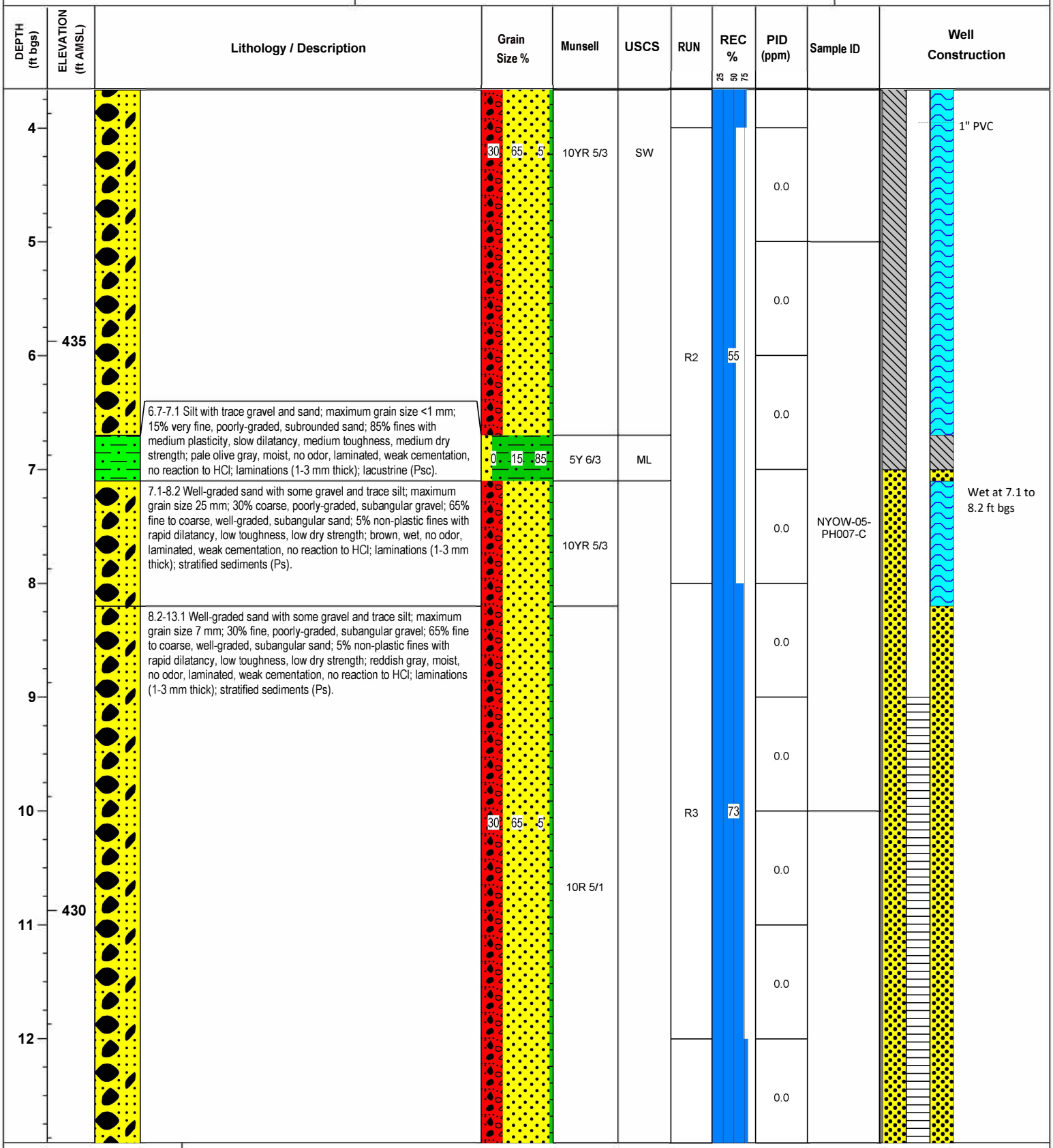
Gravel, Fines, Sand, Bentonite, Screen, Aquifer, Water Level

NOTES:

Water Level = 1.92 ft btoc = 0.82 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-008

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

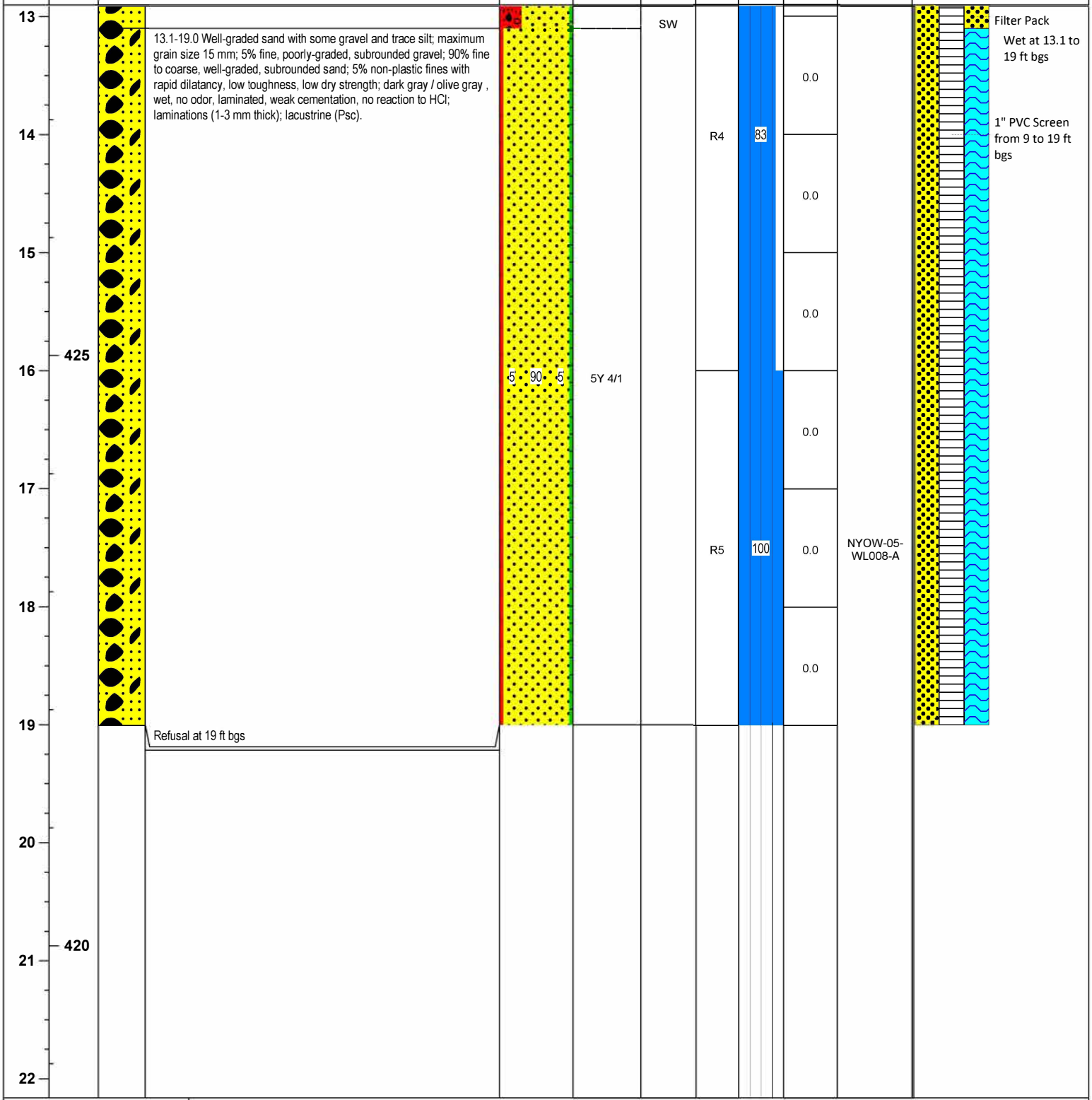
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 1.92 ft btoc = 0.82 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-008

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Water Level = 1.92 ft btoc = 0.82 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-009
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Storage Area	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156439.88, E 895204.76	**Surface Elevation:** 439 ft AMSL
Start Date: 1/7/21 **End Date:** 1/7/21	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 10 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % Gravel	Sand	Fines	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	439	0.0-0.4 Sandy organic soil with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; black, dry, no odor, blocky, weak cementation, no reaction to HCl; coal dust; topsoil.	40	50	10	N1	OL	R1	60	0.0	NYOW-05-SL009-A	
1										0.0		
2		0.4-5.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; black, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).				10YR 2/1				0.0	NYOW-05-PH009-B	
3										0.0		
4	435									0.0		
5		5.0-9.5 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; light yellowish brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5	65	30		SM			0.0		
6								R2	68	0.0		
7						10YR 6/4				0.0	NYOW-05-PH009-C	
8										0.0		
9	430							R3	100	0.0		
10		9.5-10.0 Poorly-graded gravel with little sand; maximum grain size 40 mm; 75% coarse, poorly-graded, angular gravel; 25% fine to coarse, well-graded, angular sand; black, wet, no odor, fissured, moderate cementation, strong reaction to HCl; weathered shale; weathered bedrock. End boring at 10 ft bgs	75	25	0	GLEY 1 3/N	GP					
11												
12												

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-010
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

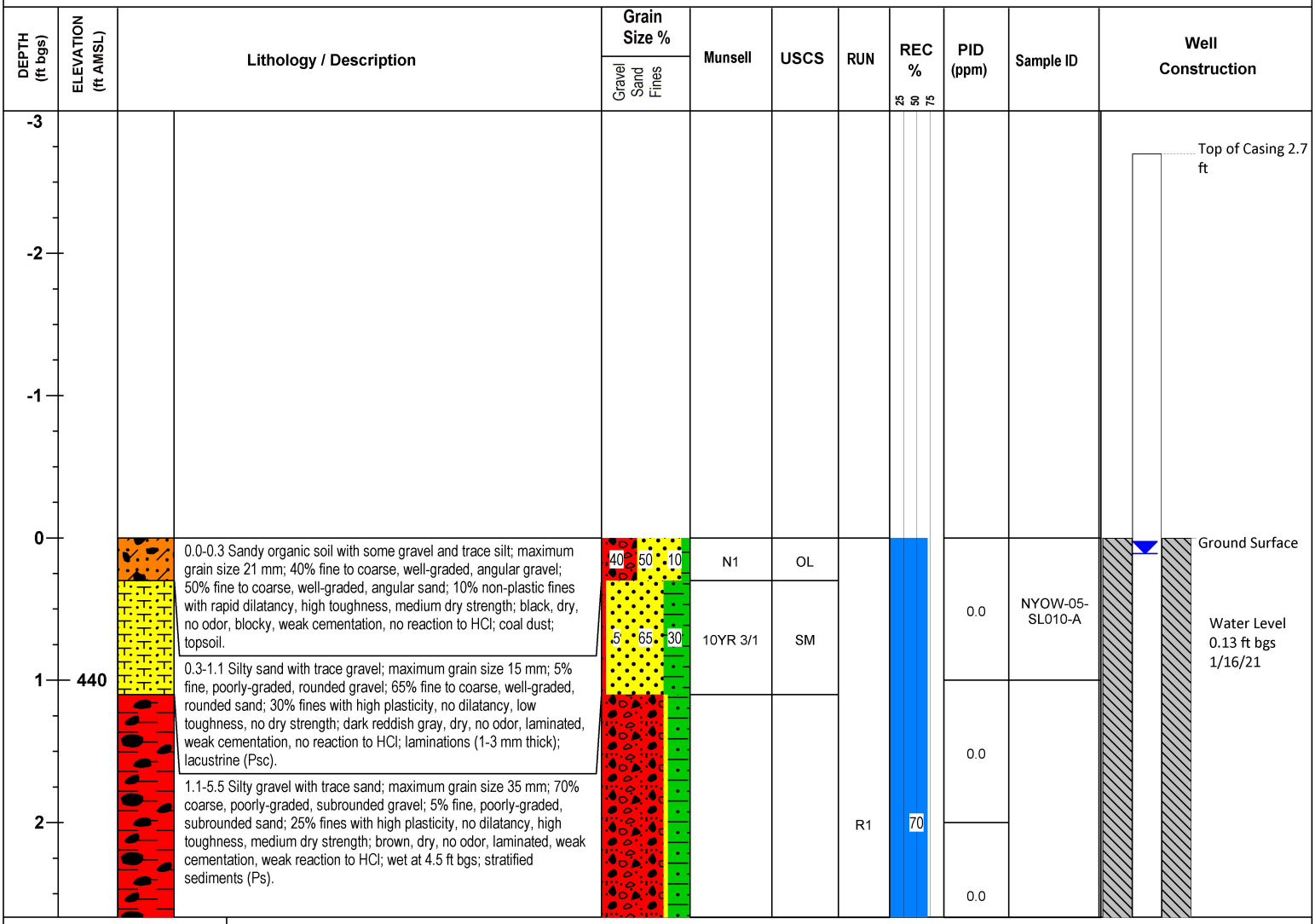
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: J. Maule/E. Magee	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Storage Area	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156373.37, E 895241.92	**Surface Elevation:** 441 ft AMSL
Start Date: 1/7/21 **End Date:** 1/11/21	**Casing Elevation:** 442.056 ft AMSL

Depth to Groundwater: 4.5 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 20 ft bgs

Depth to Water and Elapsed Time After Drilling: 0.13 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 10 to 20 ft bgs



Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 2.83 ft btoc = 0.13 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-010

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
3			70 5 25	10YR 5/3	GM			0.0	NYOW-05-PH010-B	1" PVC
4								0.0		Bentonite Seal
5								0.0		Wet at 4.5 to 4.7 ft bgs
		5.5-6.0 Silt with trace gravel and sand; maximum grain size 7 mm; 5% fine, poorly-graded, rounded gravel; 10% fine to coarse, well-graded, rounded sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; pale olive gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 10 85	5Y 6/3	ML			0.0		
6	435	6.0-8.0 Silty gravel with trace sand; maximum grain size 35 mm; 70% coarse, poorly-graded, subrounded gravel; 5% fine, poorly-graded, subrounded sand; 25% fines with high plasticity, no dilatancy, high toughness, medium dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).				R2	53	0.0		
7			70 5 25	10YR 5/3	GM			0.0	NYOW-05-PH010-C	
8		8.0-12.0 Well-graded sand with little gravel and trace silt; maximum grain size 7 mm; 25% fine, poorly-graded, subangular gravel; 70% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, low dry strength; reddish gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).						0.0		Wet at 8 to 12 ft bgs
9								0.0		
10			25 70 5	10R 5/1	SW	R3	58	0.0		
11	430							0.0		

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 2.83 ft btoc = 0.13 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-010

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
12		12.0-15.0 Gravelly Elastic silt with little gravel and trace sand; maximum grain size 33 mm; 25% fine to coarse, well-graded, subangular gravel; 5% fine, poorly-graded, subangular sand; 70% fines with high plasticity, no dilatancy, low toughness, low dry strength; gray, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).						0.0		
13			25 5 70	7.5YR 5/1	MH			0.0		
14						R4	85	0.0		Filter Pack
15		15.0-20.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; reddish gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0	NYOW-05-WL010-A	1" PVC Screen from 10 to 20 ft bgs
16	425							0.0		Wet at 15 to 20 ft bgs
17			5 65 30	10R 5/1	SM			0.0		
18						R5	100	0.0		
19								0.0		
20		Refusal at 20 ft bgs								
21	420									

Legend

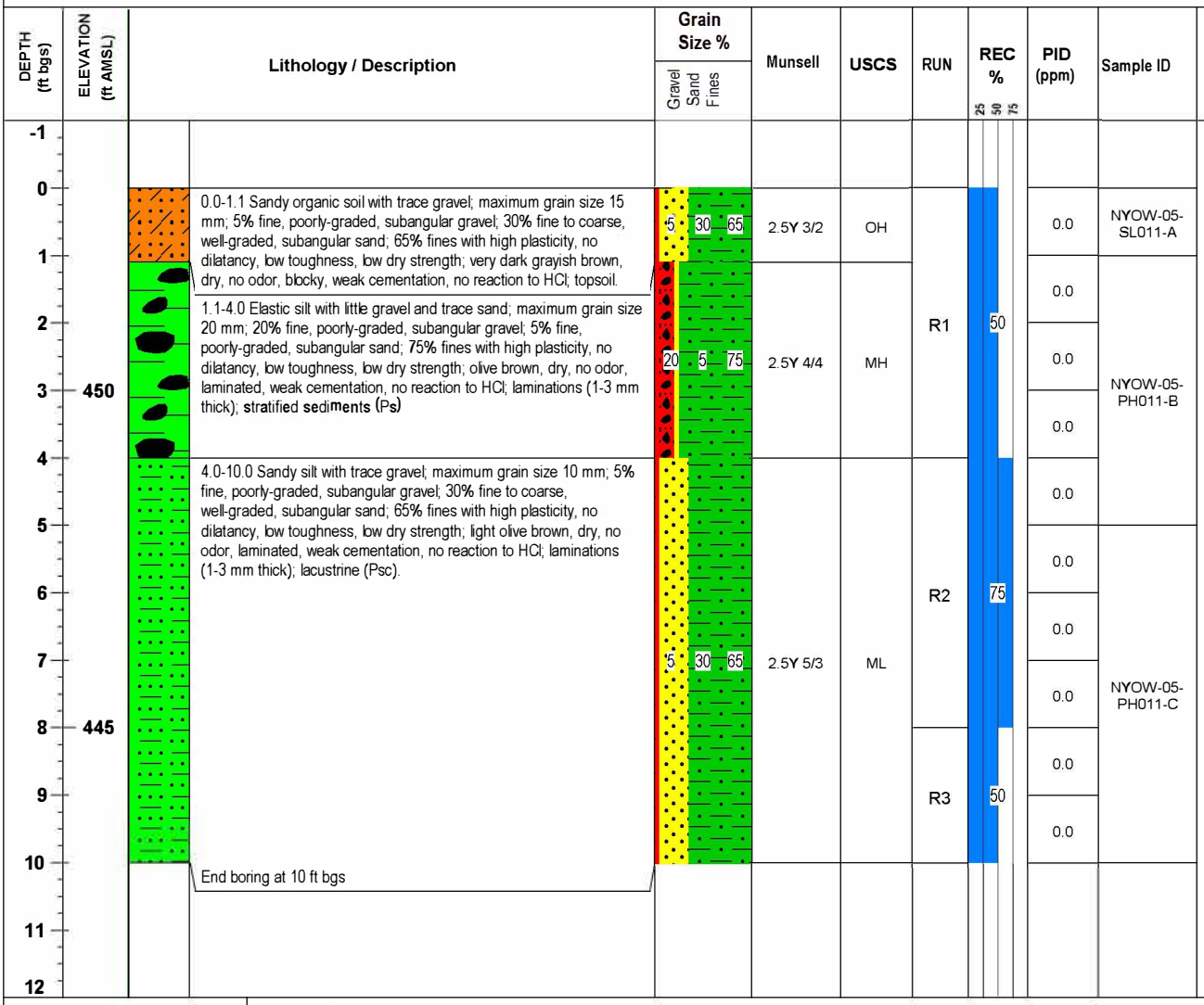
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level = 2.83 ft btoc = 0.13 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY	**Borehole ID:** NYOW-05-011
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056
Date: 3/8/21 (Revised)	
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Electric Substation	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1157020.22, E 895362.65	**Surface Elevation:** 453 ft AMSL
Start Date: 1/13/21	**End Date:** 1/13/21 — **Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 10 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel | Fines | Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-012
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Electic Substation	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1157009.38, E 895409.23	**Surface Elevation:** 453.933 ft AMSL
Start Date: 1/13/21 **End Date:** 1/13/21	**Casing Elevation:** 456.013 ft AMSL

Depth to Groundwater: 22 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 26.5 ft bgs

Depth to Water and Elapsed Time After Drilling: 9.88 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 16.5 to 26.5 ft bgs

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
0	455	0.0-1.0 Sandy organic soil with some gravel, little silt, and trace clay; maximum grain size 15 mm; 31.8% fine, poorly-graded, subangular gravel; 42.8% fine to coarse, well-graded, subangular sand; 25.4% fines with high plasticity, no dilatancy, low toughness, low dry strength; very dark grayish brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	32 / 43 / 25	2.5Y 3/2	OH	R1	50	0.0	NYOW-05-SL012-A	Top of Casing 2.1 ft; Ground Surface
1		1.0-4.0 Poorly-graded gravel with little sand and trace silt; maximum grain size 50 mm; 75% coarse, poorly-graded, subangular gravel; 20% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, low dry strength; very dark bluish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps).	75 / 20 / 5	10B 3/1	GP			0.0	NYOW-05-PH012-B	
2								0.0		
3										

Legend

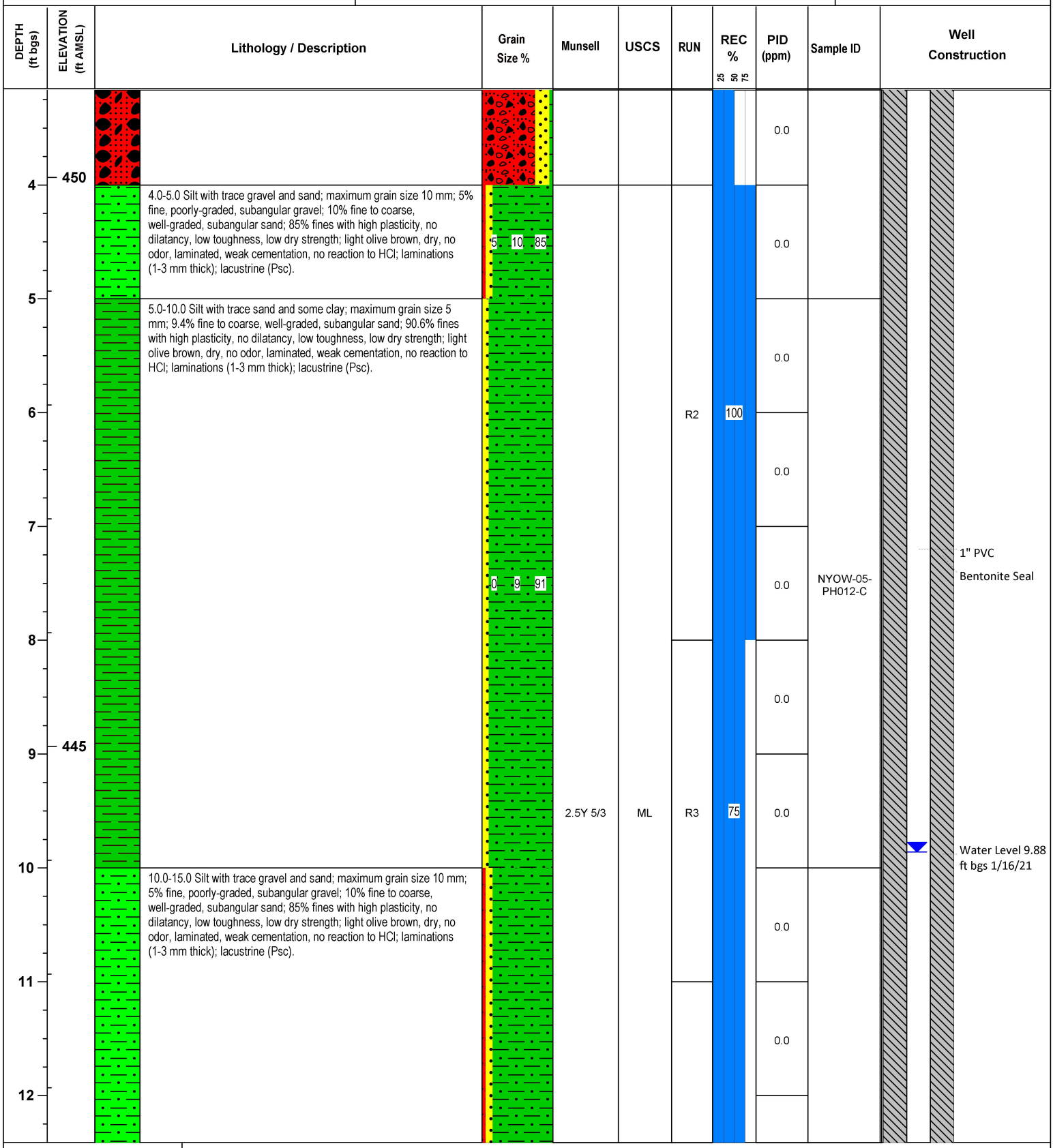
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 11.98 ft btoc = 9.88 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-012

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

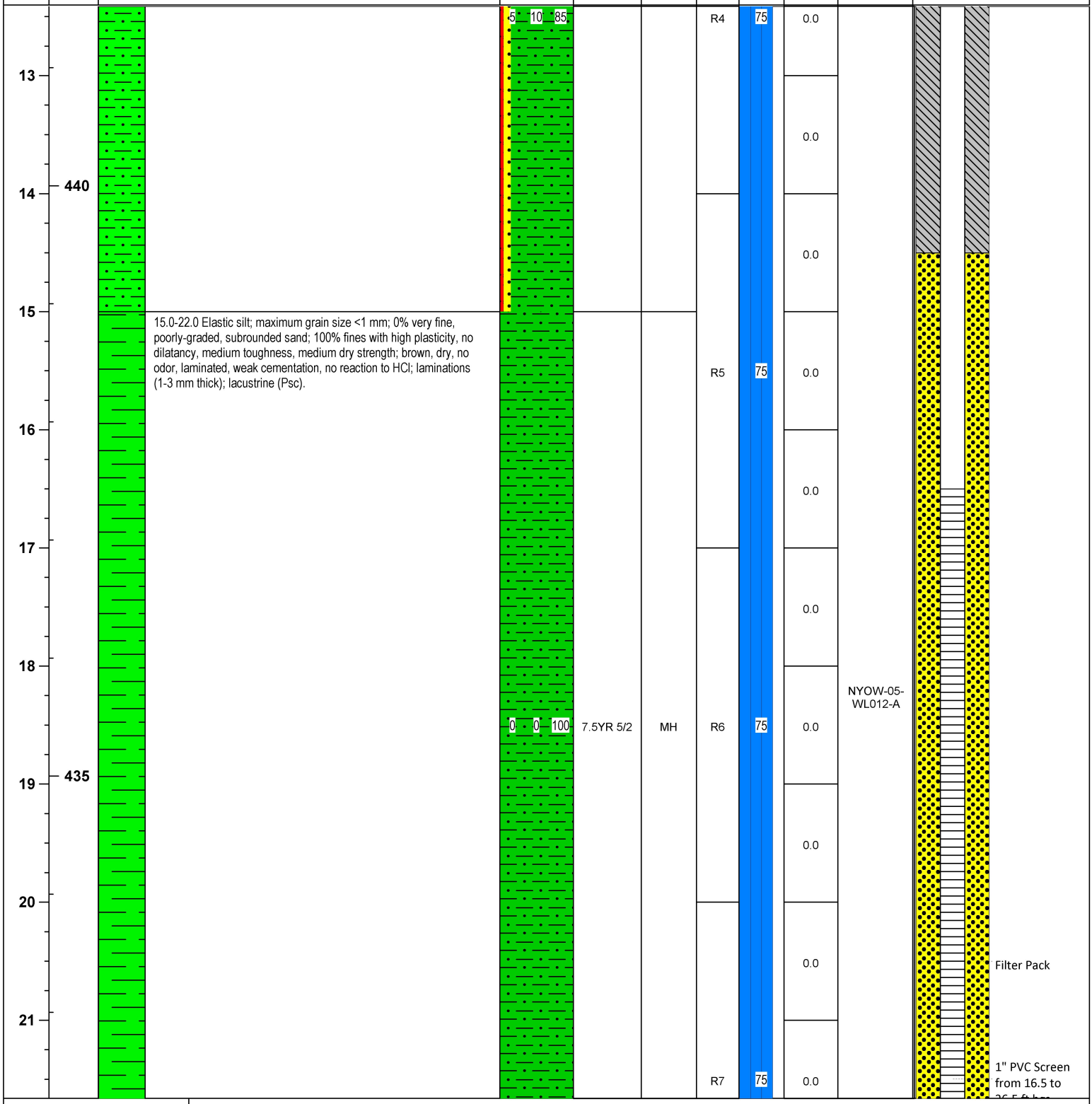
Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Water Level on 1/16/21 = 11.98 ft btoc = 9.88 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-012

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Water Level on 1/16/21 = 11.98 ft btoc = 9.88 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-012

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC % (25 50 75)	PID (ppm)	Sample ID	Well Construction
22		22.0-26.5 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; reddish gray, moist, no odor, homogeneous, weak cementation, no reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).						0.0		26.5 ft bgs Moist 22 to 26.5 ft bgs
23								0.0		
24	430		5 65 30	10R 5/1	SM	R8	75	0.0		
25								0.0		
26		Refusal at 26.5 ft bgs				R9	100	0.0		
27										
28										
29	425									
30										

Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 11.98 ft btoc = 9.88 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-013

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 5 Electric Substation | **Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1156966.94, E 895415.04 | **Surface Elevation:** 455 ft AMSL

Start Date: 1/13/21 | **End Date:** 1/13/21 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 10 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % Gravel	Sand	Fines	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	455	0.0-0.8 Sandy organic soil with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; black, dry, no odor, blocky, weak cementation, no reaction to HCl; coal dust; topsoil.	40	50	10	N1	OL	R1	75	0.0	NYOW-05-SL013-A	
1		0.8-1.5 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5	65	30	10YR 3/1	SM			0.0		
2										0.0		
3			70	5	25	10YR 5/3	GM			0.0	NYOW-05-PH013-B	
4		1.5-4.5 Silty gravel with trace sand; maximum grain size 35 mm; 70% coarse, poorly-graded, subrounded gravel; 5% fine, poorly-graded, subrounded sand; 25% fines with high plasticity, no dilatancy, high toughness, medium dry strength; brown, dry, no odor, laminated, weak cementation, weak reaction to HCl; wet at 4.5 ft bgs; stratified sediments (Ps)								0.0		
5	450									0.0		
6		4.5-10.0 Silt with trace gravel and sand; maximum grain size 10 mm; 5% fine, poorly-graded, rounded gravel; 10% fine to coarse, well-graded, rounded sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; pale olive gray, moist, no odor, laminated, moderate cementation, weak reaction to HCl; orange redoximorphic laminations (<3 mm thick) throughout; lacustrine (Psc).						R2	75	0.0		
7			5	10	85	5Y 6/3	ML			0.0	NYOW-05-PH013-C	
8										0.0		
9								R3	75	0.0		
10	445	End boring at 10 ft bgs								0.0		
11												
12												

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-014
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Electric Substation		**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156984.55, E 895463.04		**Surface Elevation:** 455 ft AMSL
Start Date: 1/13/21	**End Date:** 1/13/21	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 10 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	455	0.0-0.5 Sandy organic soil with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; very dark grayish brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.	40 / 50 / 10	10YR 3/2	OL	R1	100	0.0	NYOW-05-SL014-A	
1								0.0		
2		0.5-5.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; dark reddish gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 65 / 30	10YR 3/1	SM			0.0	NYOW-05-PH014-B	
3								0.0		
4								0.0		
5	450	5.0-7.5 Silty gravel with trace sand; maximum grain size 35 mm; 70% coarse, poorly-graded, subrounded gravel; 5% fine, poorly-graded, subrounded sand; 25% fines with high plasticity, no dilatancy, high toughness, medium dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); stratified sediments (Ps)	70 / 5 / 25	10YR 5/3	GM	R2	100	0.0	NYOW-05-PH014-C	
6								0.0		
7								0.0		
8		7.5-10.0 Silt with trace gravel and sand; maximum grain size 8 mm; 5% fine, poorly-graded, rounded gravel; 10% fine to coarse, well-graded, rounded sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; medium dark gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 10 / 85	N4	ML	R3	100	0.0		
9								0.0		
10	445	End boring at 10 ft bgs								
11										
12										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-015
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

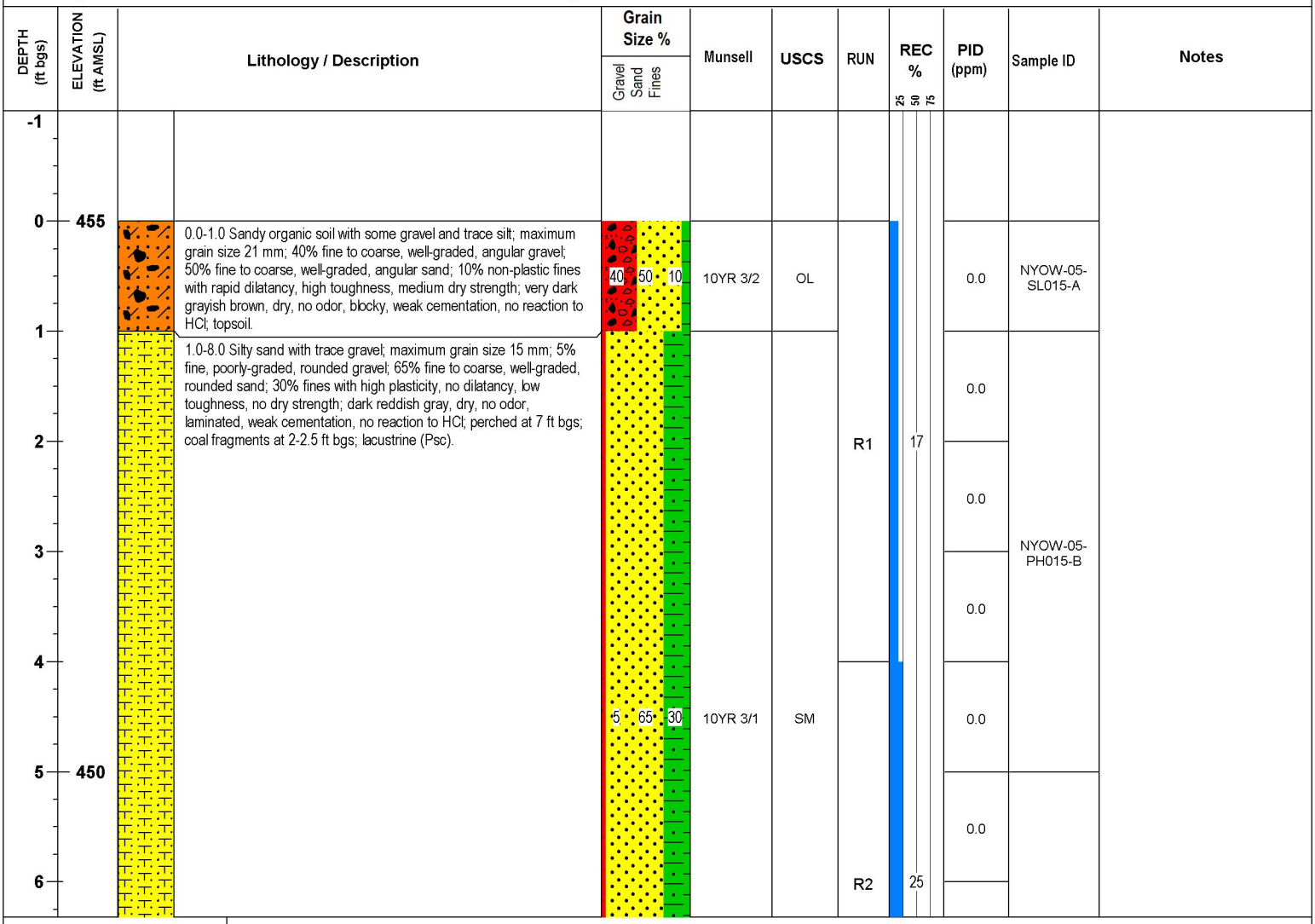
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Electric Substation	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156932.63, E 895453.23	**Surface Elevation:** 455 ft AMSL
Start Date: 1/13/21 **End Date:** 1/13/21	**Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 25.5 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples



Legend

Gravel Fines

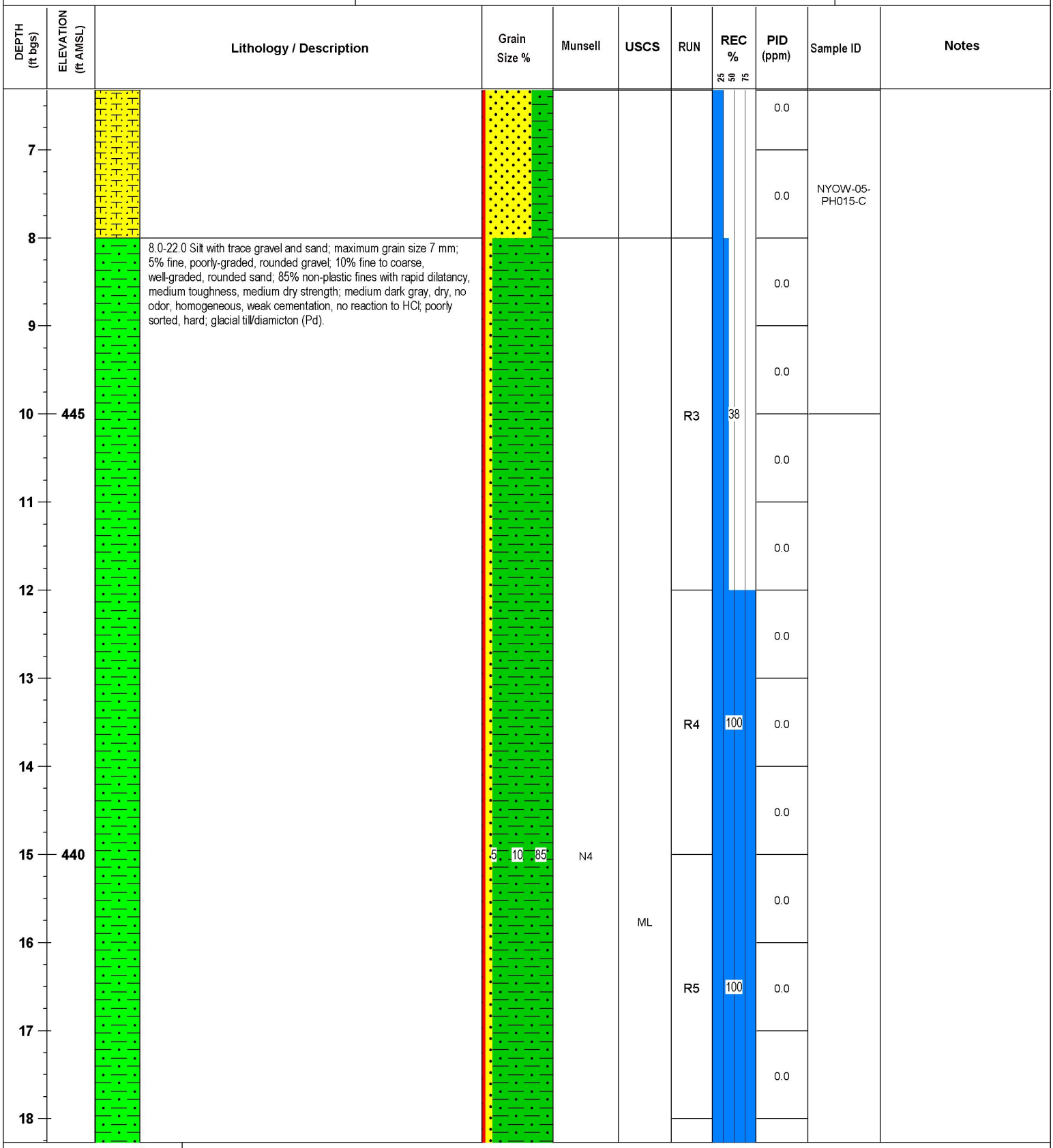
Sand

NOTES:

Did not install well because no water was observed prior to refusal. Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation will be surveyed at a later date. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-015

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

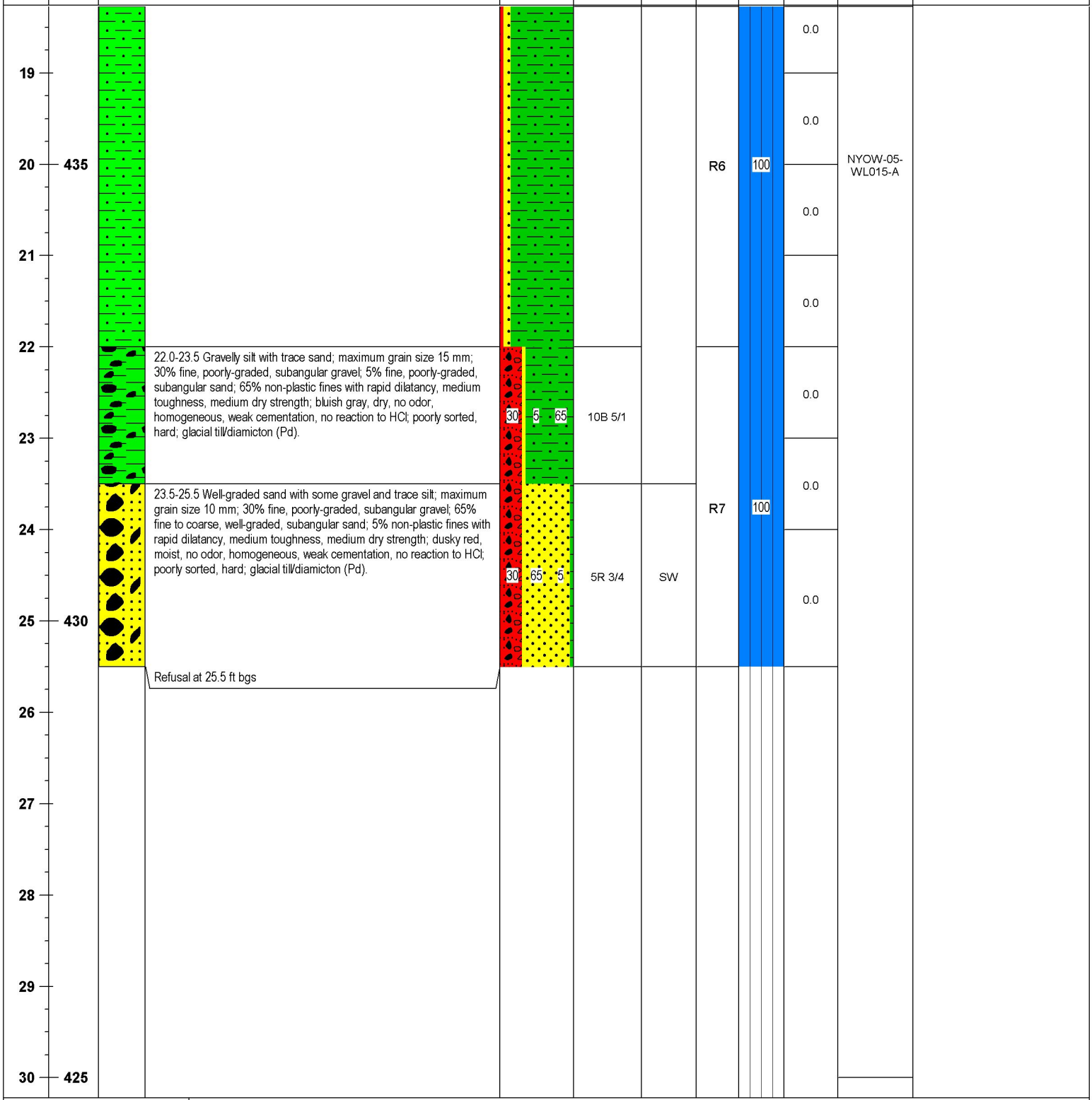
Gravel | Fines | Sand

NOTES:

Did not install well because no water was observed prior to refusal. Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation will be surveyed at a later date. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-015

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel, Fines, Sand

NOTES:

Did not install well because no water was observed prior to refusal. Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation will be surveyed at a later date. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-016
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

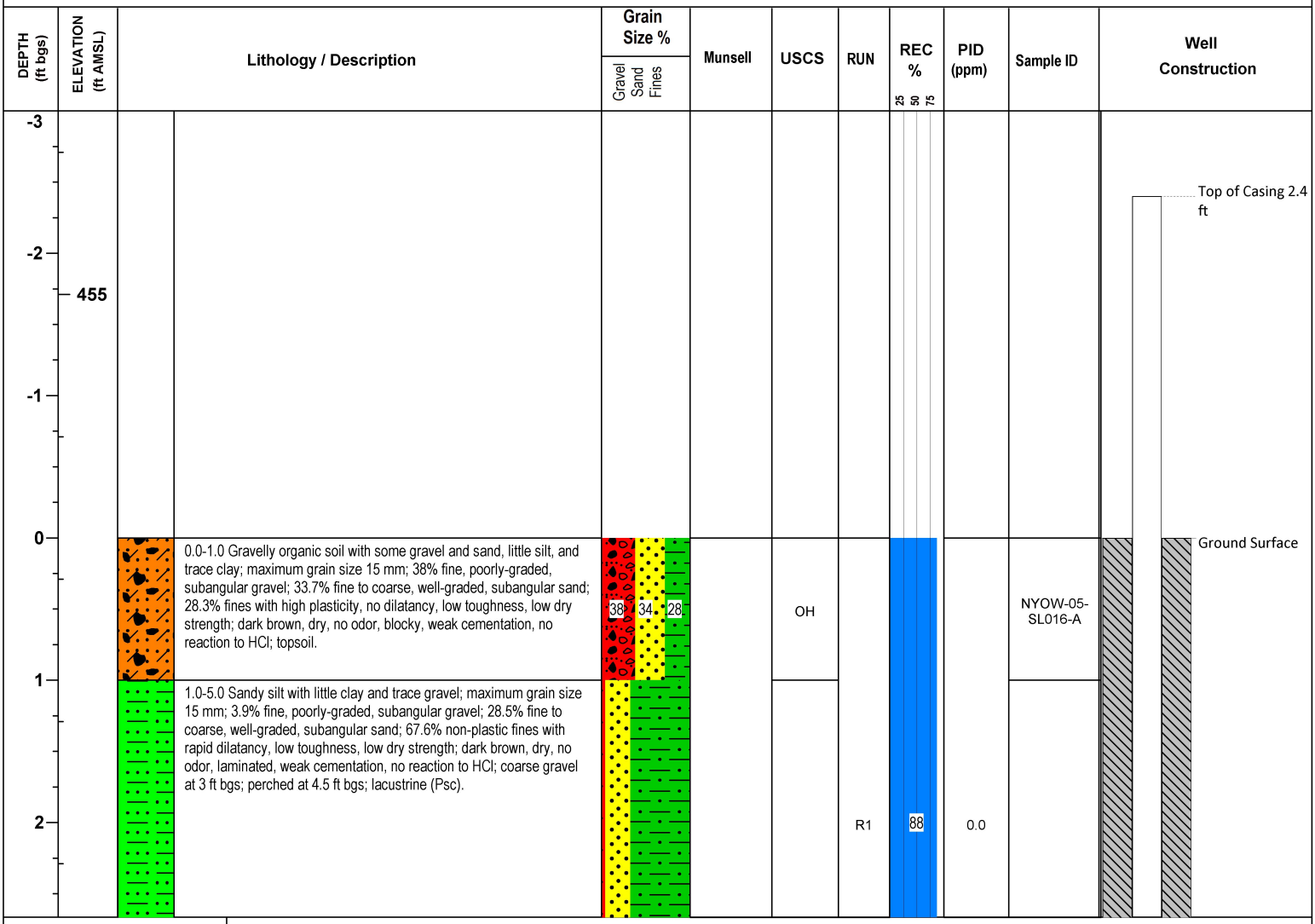
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Boiler House Swale	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156774.66, E 895521.93	**Surface Elevation:** 453.29 ft AMSL
Start Date: 1/14/21 **End Date:** 1/15/21	**Casing Elevation:** 455.996 ft AMSL

Depth to Groundwater: 23.5ft bgs **Depth to Bedrock:** n/a ft bgs **Depth Drilled into Rock:** n/a ft **Total Depth:** 28 ft bgs

Depth to Water and Elapsed Time After Drilling: 11.18 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 18 to 28 ft bgs



Legend

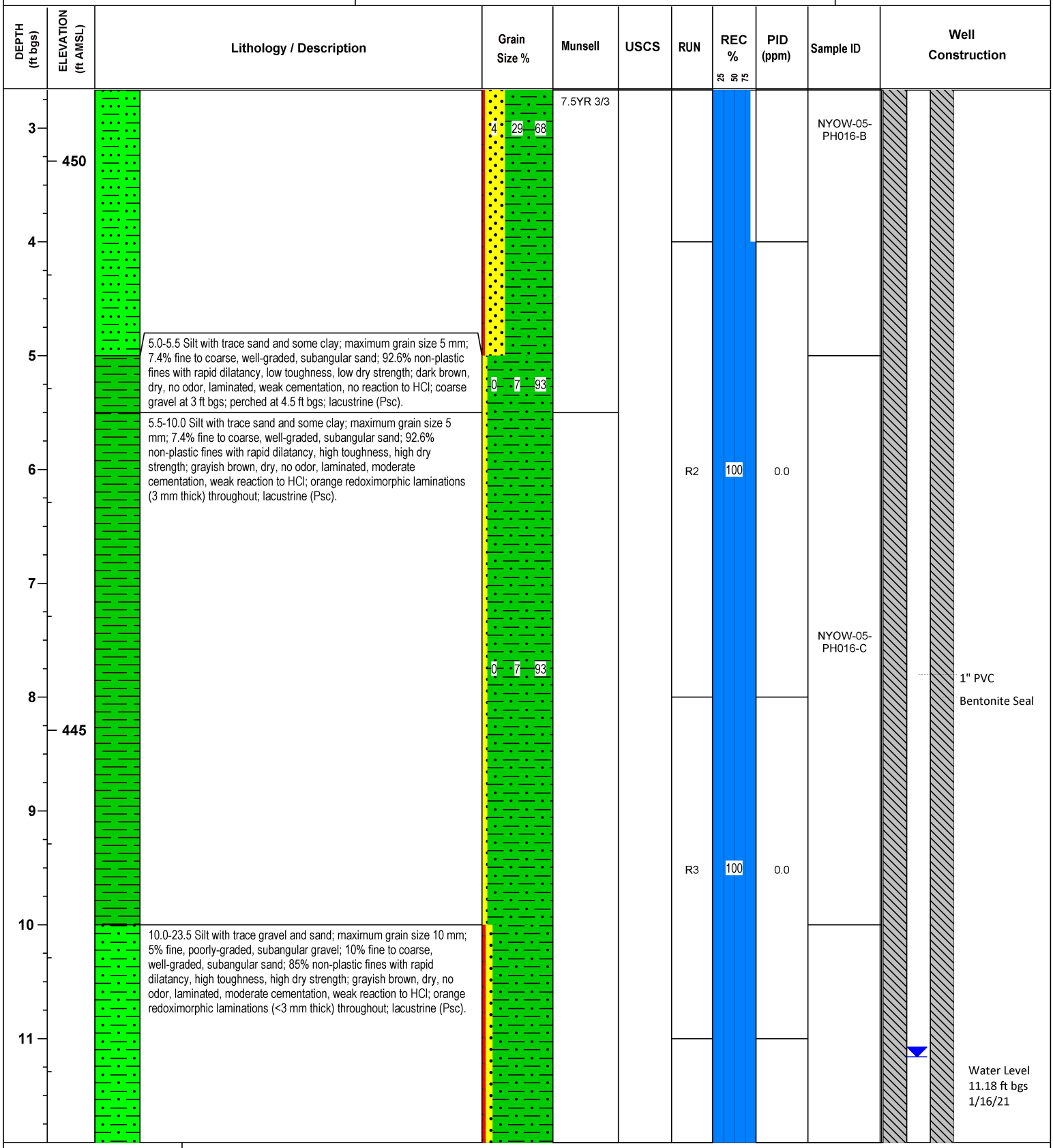
Gravel, Fines, Sand, Bentonite, Screen, Aquifer, Water Level

NOTES:

Replaced temporary well at NYOW-05-015 which hit refusal prior to encountering groundwater. Water Level = 13.58 ft btoc = 11.18 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-016

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

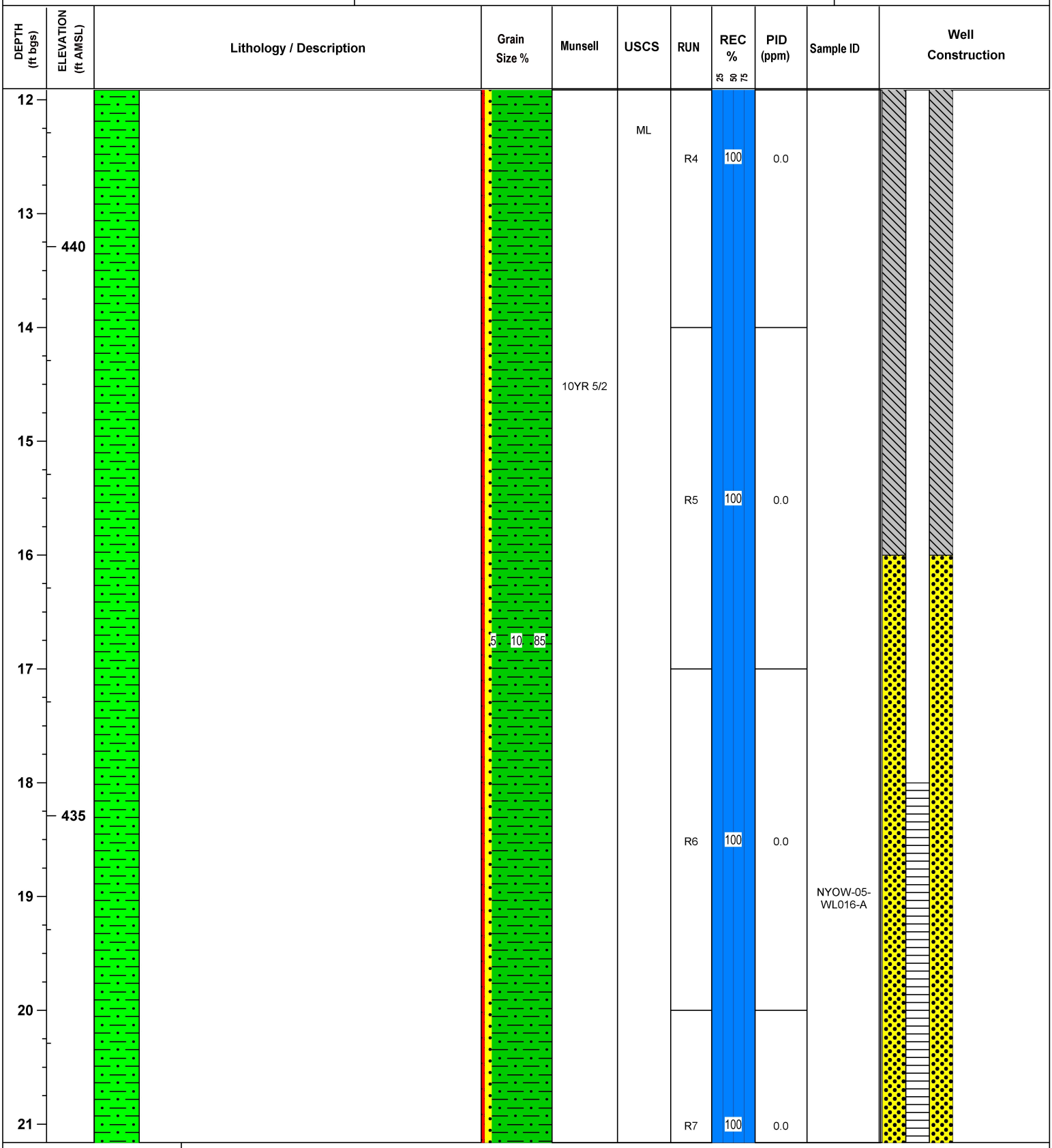
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Replaced temporary well at NYOW-05-015 which hit refusal prior to encountering groundwater. Water Level = 13.58 ft btoc = 11.18 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-016

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Replaced temporary well at NYOW-05-015 which hit refusal prior to encountering groundwater. Water Level = 13.58 ft btoc = 11.18 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-016

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC % (25 50 75)	PID (ppm)	Sample ID	Well Construction
22										Filter Pack
23	430									1" PVC Screen from 18 to 28 ft bgs
24		23.5-26.0 Silty sand with trace gravel; maximum grain size 15 mm; 10% fine to medium, well-graded, subrounded gravel; 60% fine to coarse, well-graded, subrounded sand; 30% non-plastic fines with rapid dilatancy, low toughness, no dry strength; reddish gray, wet, no odor, homogeneous, weak cementation, no reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).	10 60 30	10R 5/1	SM	R8	100	0.0		Wet at 23.5 to 26 ft bgs
25										
26		26.0-28.0 Sandy silt with little gravel; maximum grain size 10 mm; 20% fine, poorly-graded, subrounded gravel; 30% fine to coarse, well-graded, subrounded sand; 50% non-plastic fines with rapid dilatancy, low toughness, low dry strength; reddish gray, wet, no odor, homogeneous, weak cementation, no reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).				R9	100	0.0		
27			20 30 50	2.5YR 5/1	ML					
28	425	Refusal at 28 ft bgs								
29										
30										

Legend

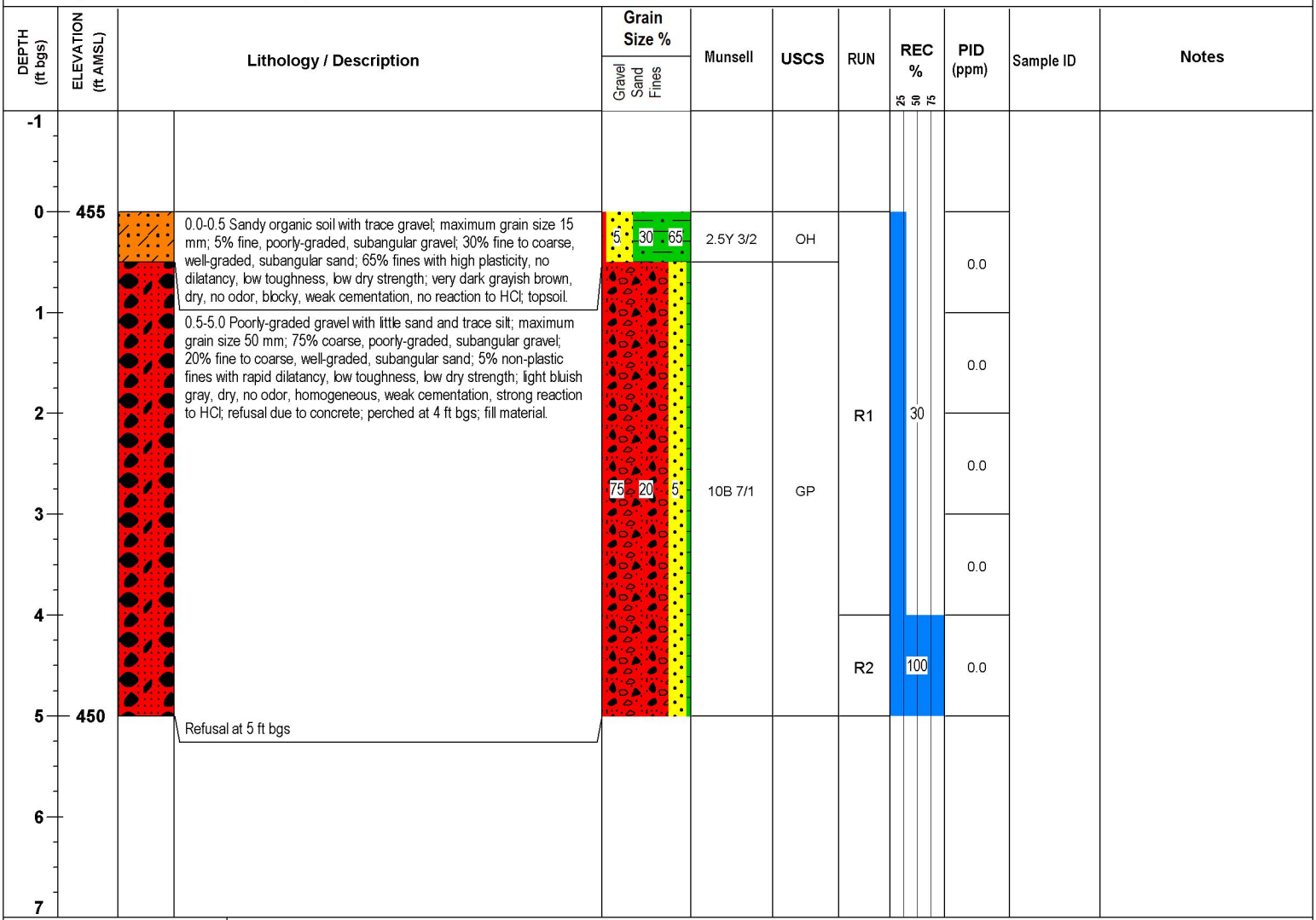
- Gravel
- Fines
- Sand
- Water Level
- Bentonite
- Screen
- Aquifer

NOTES:

Replaced temporary well at NYOW-05-015 which hit refusal prior to encountering groundwater. Water Level = 13.58 ft btoc = 11.18 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY	**Borehole ID:** NYOW-05-017
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056
Date: 3/8/21 (Revised)	
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Boiler House	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156749.95, E 895480.53	**Surface Elevation:** 455 ft AMSL
Start Date: 1/14/21	**End Date:** 1/14/21 — **Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs — **Depth Drilled into Rock:** n/a ft — **Total Depth:** 5 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: No samples collected	



Legend

Gravel, Fines, Sand

NOTES:

Refusal at 5 ft bgs. Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-017-1
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

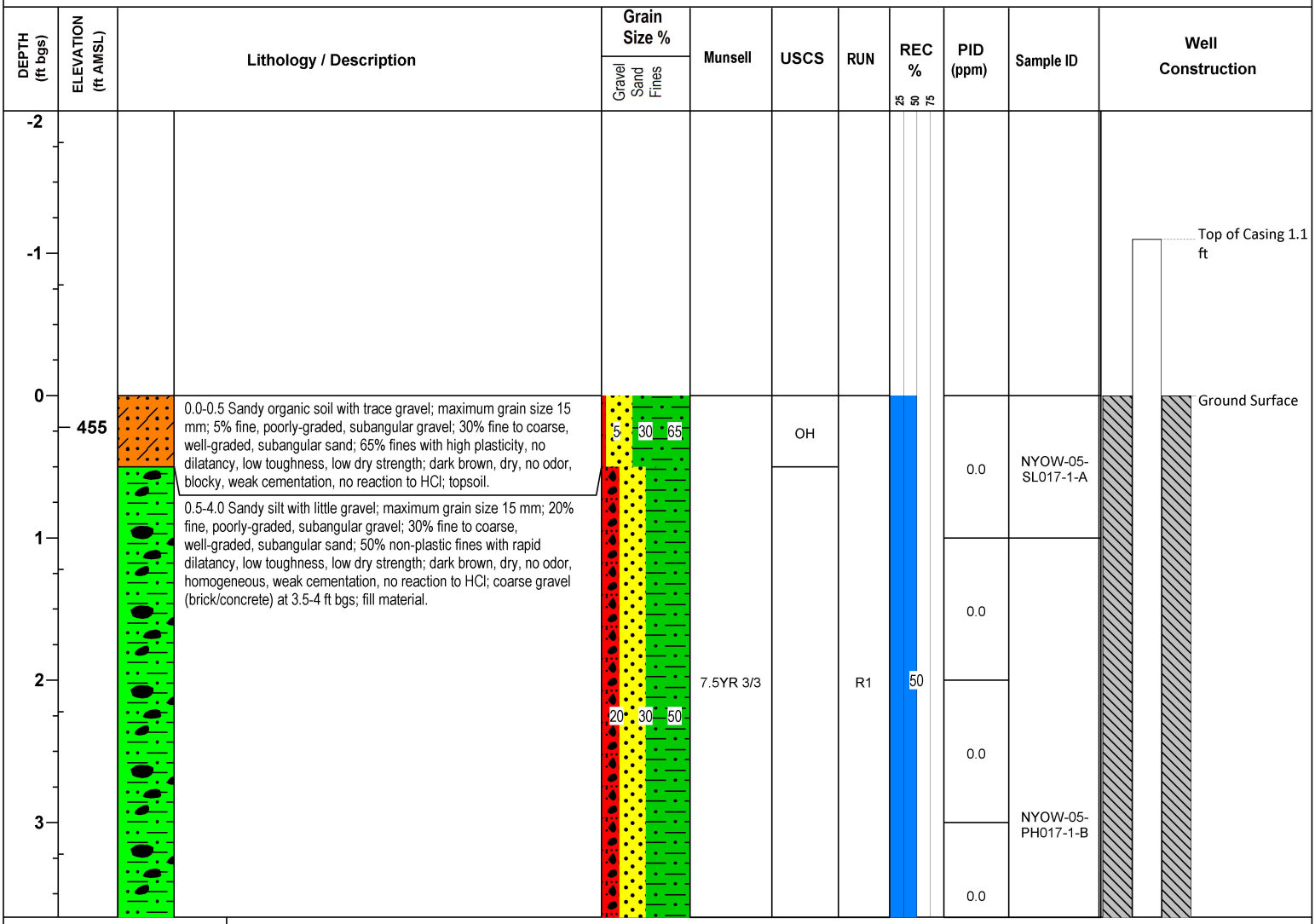
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Boiler House	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates:	**Surface Elevation:** 455.222 ft AMSL
Start Date: 1/14/21 **End Date:** 1/14/21	**Casing Elevation:** 455.216 ft AMSL

Depth to Groundwater: 25 ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 29 ft bgs

Depth to Water and Elapsed Time After Drilling: 12.32 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 19 to 29 ft bgs



Legend

Gravel | Bentonite | Fines | Screen | Sand | Aquifer | Water Level

NOTES:

Well is offset 5 ft north of NYOW-05-017. Water Level = 13.42 ft btoc = 12.32 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-017-1

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC % (25 50 75)	PID (ppm)	Sample ID	Well Construction
4		4.0-10.0 Silt with trace gravel and sand; maximum grain size 8 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% non-plastic fines with rapid dilatancy, medium toughness, medium dry strength; grayish brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).		10YR 5/2				0.0		
5	450							0.0		
6						R2	100	0.0		
7								0.0		
8								0.0	NYOW-05-PH017-1-C	Bentonite Seal
9								0.0		1" PVC
10	445	10.0-23.0 Silt with trace gravel and sand; maximum grain size 7 mm; 5% fine, poorly-graded, subangular gravel; 10% fine to coarse, well-graded, subangular sand; 85% non-plastic fines with rapid dilatancy, high toughness, very high dry strength; dark gray / olive gray , dry, no odor, homogeneous, weak cementation, no reaction to HCl; poorly sorted, hard; glacial till/diamicton (Pd).				R3	100	0.0		
11								0.0		
12								0.0		Water Level 12.32 ft bgs 1/16/21

Legend

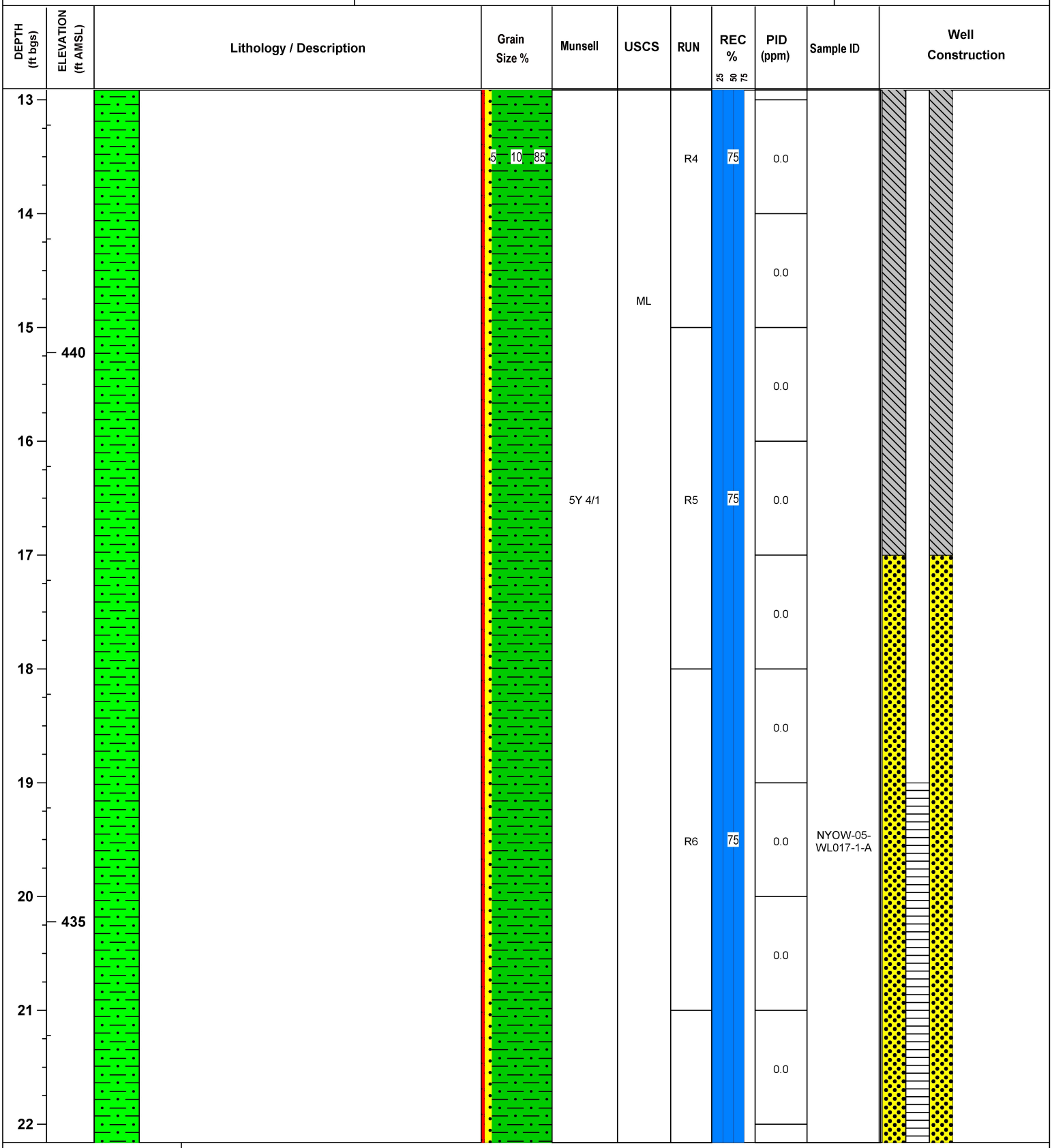
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Well is offset 5 ft north of NYOW-05-017. Water Level = 13.42 ft btoc = 12.32 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-017-1

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Well is offset 5 ft north of NYOW-05-017. Water Level = 13.42 ft btoc = 12.32 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-017-1

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC % (25 50 75)	PID (ppm)	Sample ID	Well Construction
23		23.0-29.0 Sandy silt with little gravel; maximum grain size 10 mm; 20% fine, poorly-graded, subrounded gravel; 30% fine to coarse, well-graded, subrounded sand; 50% non-plastic fines with rapid dilatancy, low toughness, low dry strength; reddish gray, wet, no odor, homogeneous, weak cementation, no reaction to HCl; wet at 25 ft bgs; glacial till/diamicton (Pd).				R7	75	0.0		Filter Pack
24								0.0		
								0.0		1" PVC Screen from 19 to 29 ft bgs
25	430					R8	67	0.0		Wet at 25 ft bgs
26			20 30 50	2.5YR 5/1				0.0		
27								0.0		
28						R9	100	0.0		
29		Refusal at 29 ft bgs								
30	425									
31										

Legend

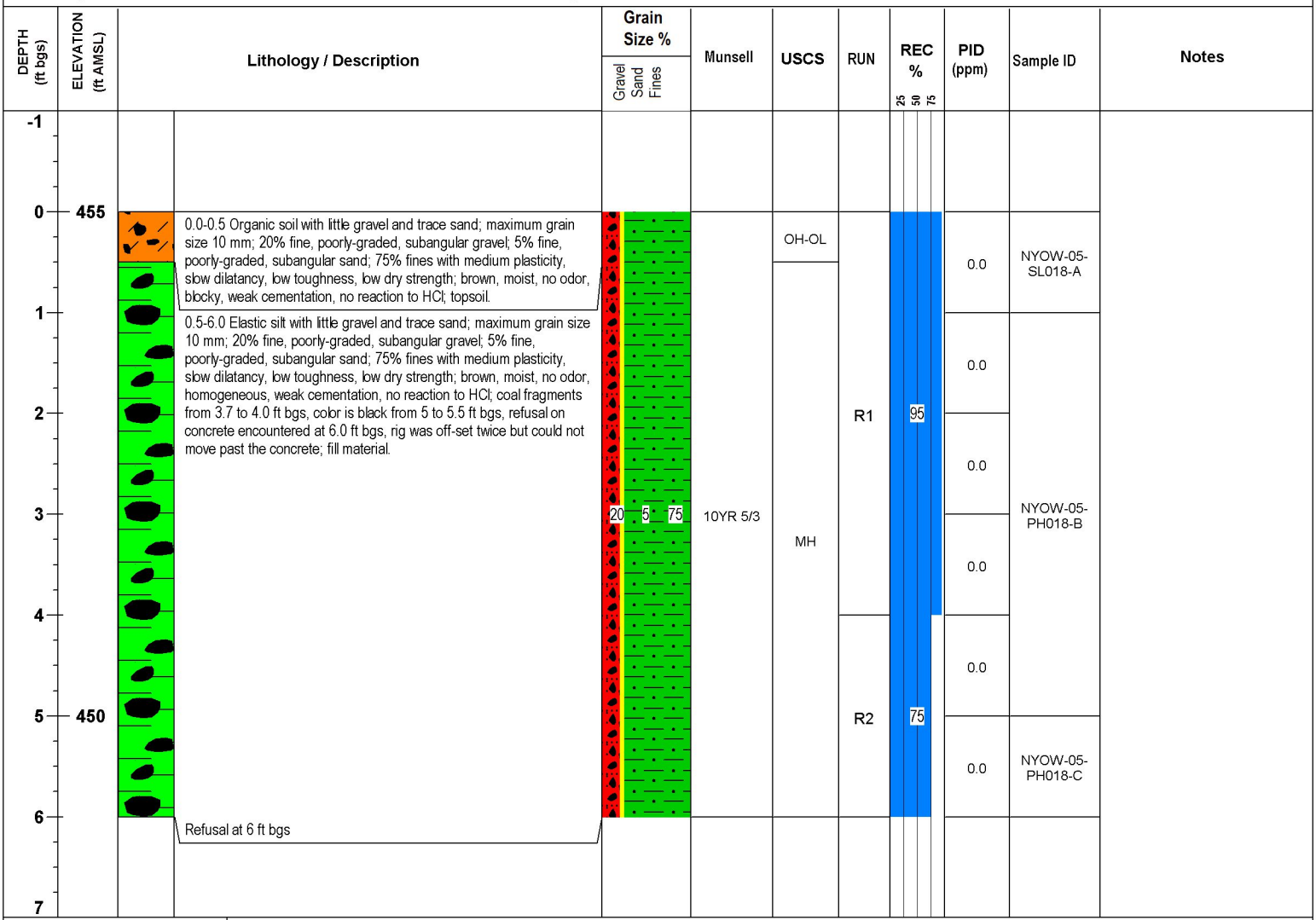
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Well is offset 5 ft north of NYOW-05-017. Water Level = 13.42 ft btoc = 12.32 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY	**Borehole ID:** NYOW-05-018
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056
Date: 3/8/21 (Revised)	
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Boiler House	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156687.94, E 895445.53	**Surface Elevation:** 455 ft AMSL
Start Date: 1/11/21	**End Date:** 1/11/21
Casing Elevation: n/a ft AMSL	
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs
Depth Drilled into Rock: n/a ft	**Total Depth:** 6 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a	
Other Water Level Measurements: n/a	
Description of Hole: Discrete surface/subsurface soil samples	



Legend

Gravel Fines

Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-019
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

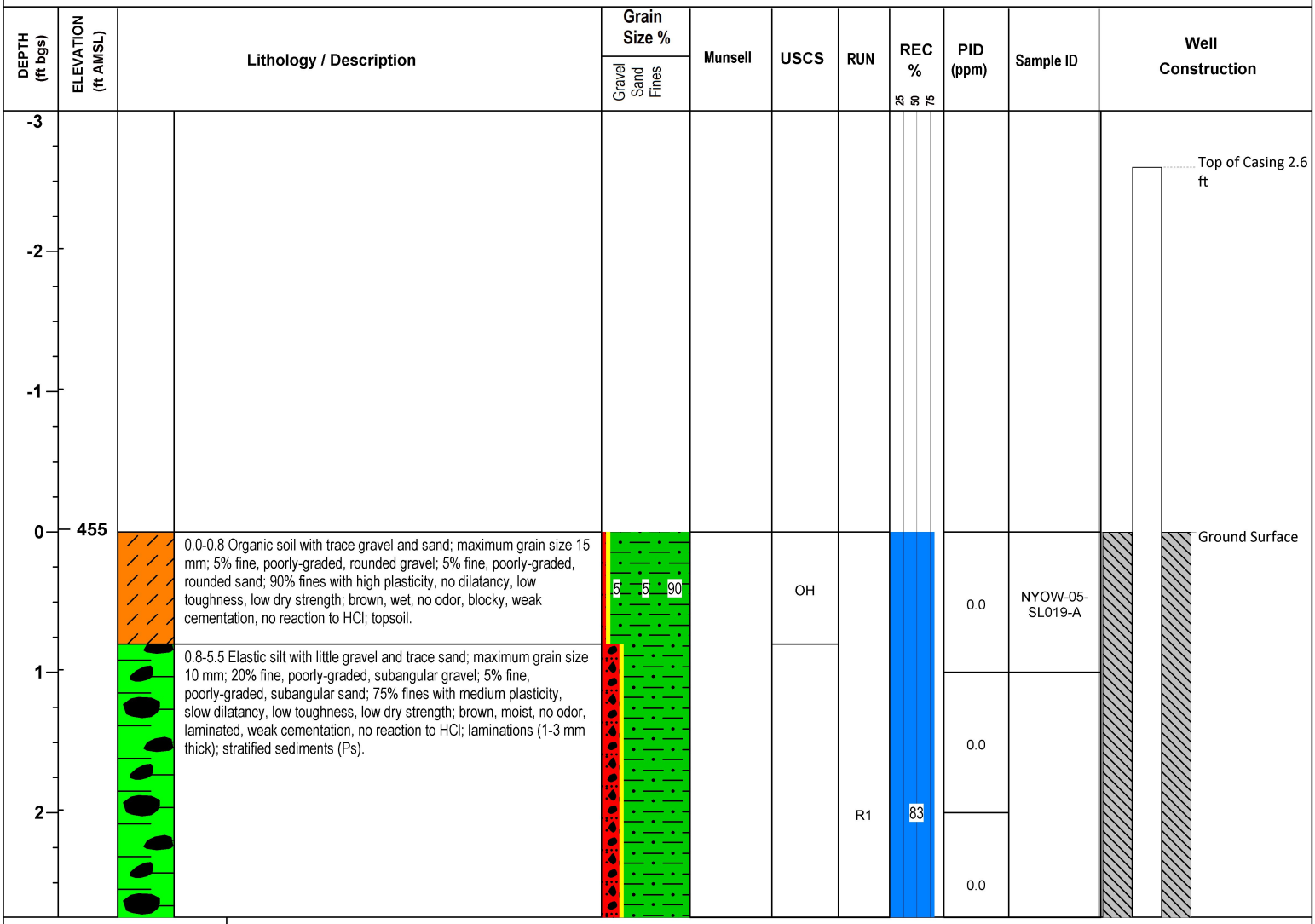
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Boiler House	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156703.12, E 895487.6	**Surface Elevation:** 454.981 ft AMSL
Start Date: 1/11/21 **End Date:** 1/11/21	**Casing Elevation:** 454.967 ft AMSL

Depth to Groundwater: 19 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 21 ft bgs

Depth to Water and Elapsed Time After Drilling: 3.51 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 11 to 21 ft bgs



Legend

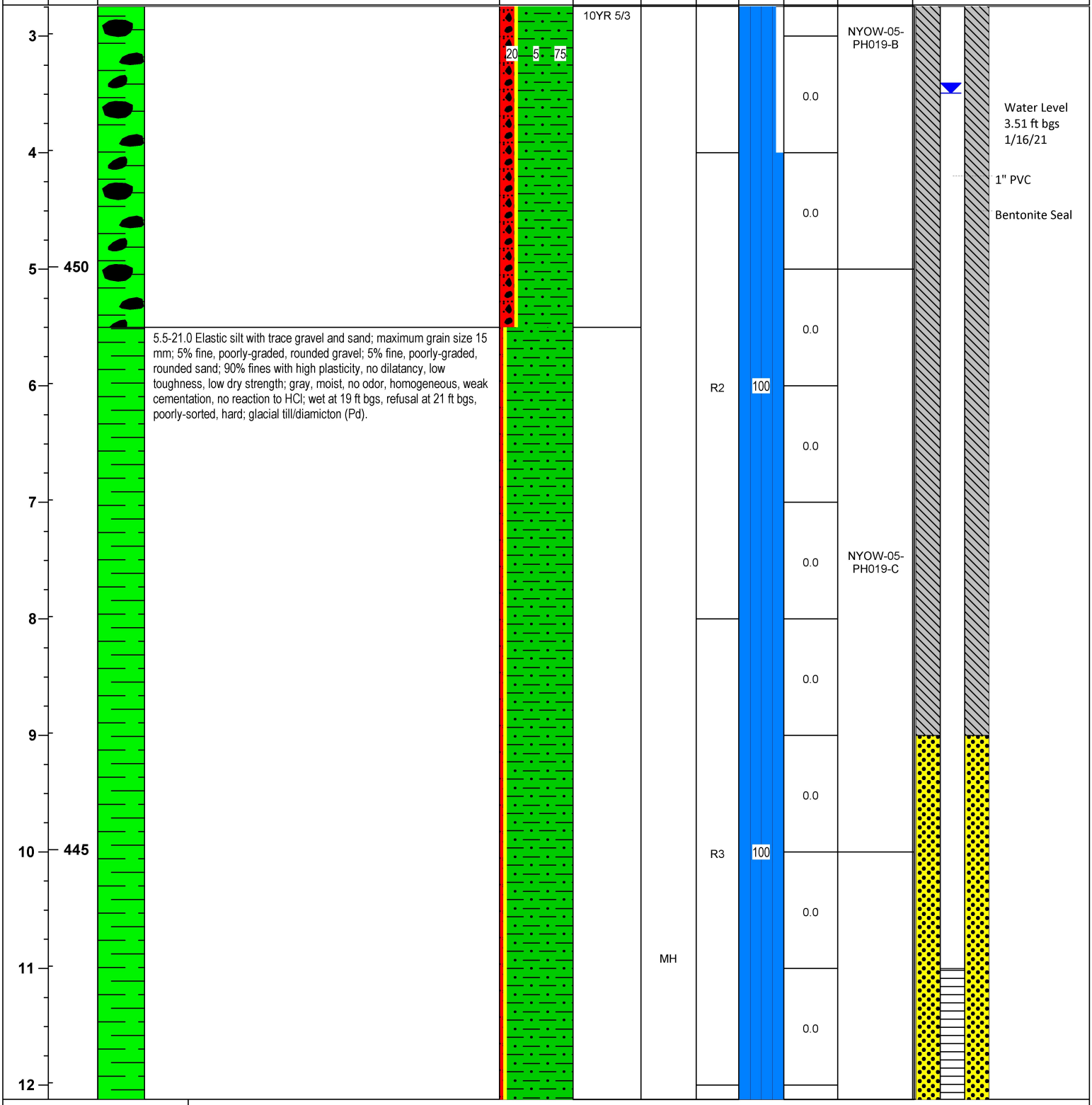
Gravel, Fines, Sand, Bentonite, Screen, Aquifer, Water Level

NOTES:

Water Level on 1/16/21 = 6.11 ft btoc = 3.51 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-019

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

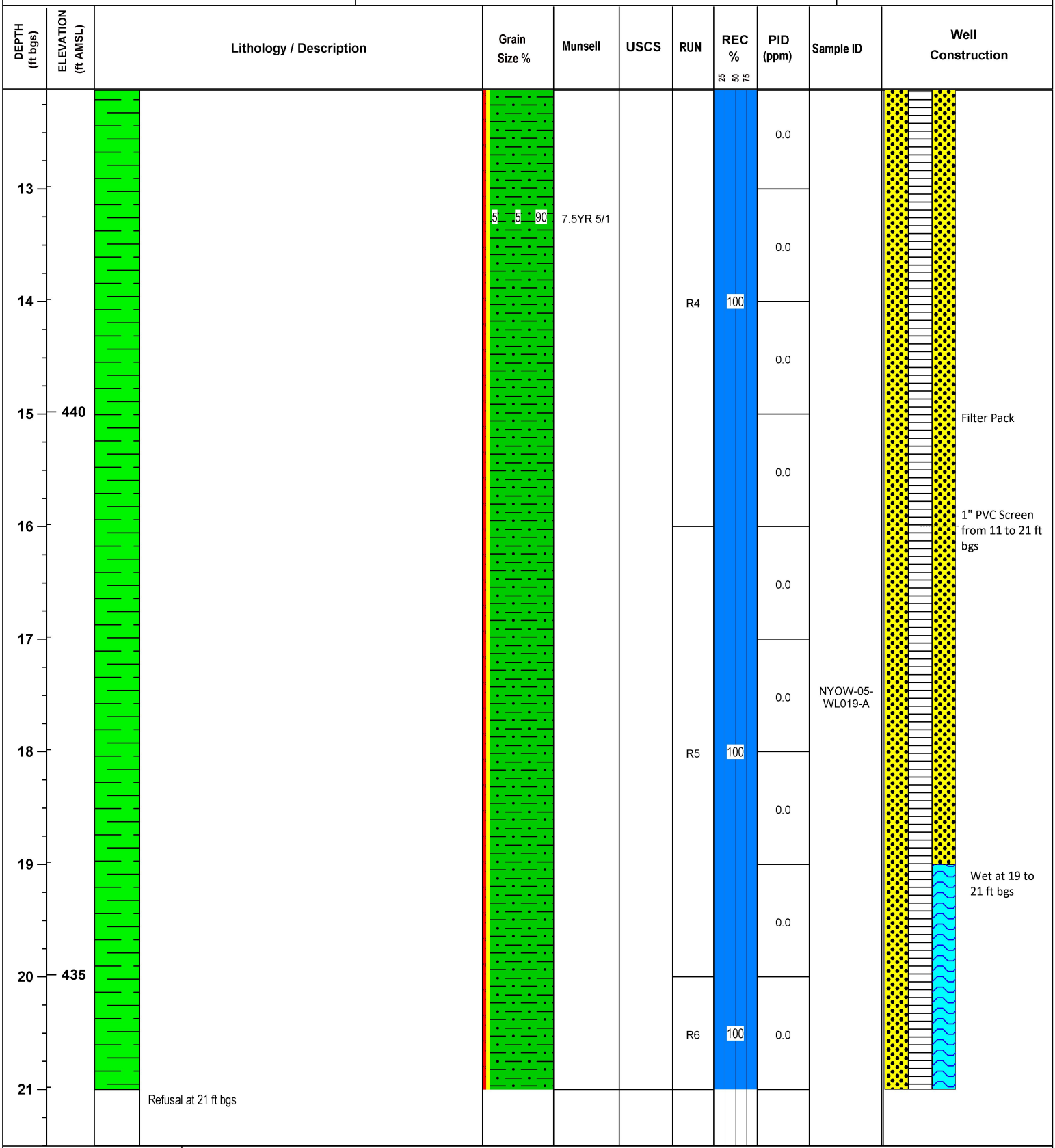
Gravel | Bentonite
Fines | Screen
Sand | Aquifer
Water Level

NOTES:

Water Level on 1/16/21 = 6.11 ft btoc = 3.51 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-019

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 6.11 ft btoc = 3.51 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-020
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Boiler House		**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156650.57, E 895493.6		**Surface Elevation:** 454 ft AMSL
Start Date: 1/8/21	**End Date:** 1/8/21	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: n/a ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 10 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	454	0.0-0.3 Sandy organic soil with little gravel and silt; maximum grain size 33 mm; 20% fine to coarse, well-graded, subangular gravel; 60% fine to coarse, well-graded, subangular sand; 20% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; brown, dry, no odor, blocky, weak cementation, no reaction to HCl; topsoil.			OH-OL			0.0	NYOW-05-SL020-A	
2		0.3-2.4 Silty sand with little gravel; maximum grain size 33 mm; 20% fine to coarse, well-graded, subangular gravel; 60% fine to coarse, well-graded, subangular sand; 20% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lstratifiled sledimlents (Ps)	20 / 60 / 20	10YR 5/3	SM	R1	100	0.0 0.0 0.0	NYOW-05-PH020-B	
4	450	2.4-4.0 Silty sand with little gravel; maximum grain size 33 mm; 20% fine to coarse, well-graded, subangular gravel; 60% fine to coarse, well-graded, subangular sand; 20% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; gray, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 65 / 30	7.5YR 5/1				0.0		
6		4.0-5.0 Silty sand with trace gravel; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 65% fine to coarse, well-graded, rounded sand; 30% fines with high plasticity, no dilatancy, low toughness, no dry strength; gray, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).				R2	100	0.0 0.0	NYOW-05-PH020-C	
8		5.0-10.0 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; orange redoximorphic laminations (<3 mm thick) throughout; lacustrine (Psc).	5 / 5 / 90	10YR 5/3	MH			0.0		
9	445					R3	100	0.0 0.0		
10		End boring at 10 ft bgs								

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-021
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)
Company Name: Bluestone Environmental Group, Inc.		**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG		**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Aggregate Bin		**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central		**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156854.81, E 895386.58		**Surface Elevation:** 453 ft AMSL
Start Date: 1/8/21	**End Date:** 1/8/21	**Casing Elevation:** n/a ft AMSL
Depth to Groundwater: 5 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft **Total Depth:** 10 ft bgs
Depth to Water and Elapsed Time After Drilling: n/a		
Other Water Level Measurements: n/a		
Description of Hole: Discrete surface/subsurface soil samples		

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-1.0 Sandy organic soil with some silt and trace gravel; maximum grain size 20 mm; 10% fine, poorly-graded, subrounded gravel; 50% fine to coarse, well-graded, subrounded sand; 40% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; black, dry, no odor, blocky, weak cementation, no reaction to HCl; large root from 0.5 to 1 ft bgs; topsoil.	10 / 50 / 40	N1	OH-OL			0.0	NYOW-05-SL021-A	
1								0.0		
2		1.0-5.5 Well-graded sand with some gravel and trace silt; maximum grain size 35 mm; 40% fine to coarse, well-graded, subangular gravel; 55% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, medium dry strength; weak red / grayish red, dry, no odor, homogeneous, weak cementation, no reaction to HCl; brick/concrete fragments throughout; fill material.	40 / 55 / 5	10R 4/2	SW	R1	45	0.0	NYOW-05-PH021-B	
3	450							0.0		
4								0.0		
5								0.0		
6		5.5-10.0 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 5 / 90	10YR 5/3	MH	R2	73	0.0	NYOW-05-PH021-C	
7								0.0		
8	445							0.0		
9						R3	70	0.0		
10		End boring at 10 ft bgs								
11										
12										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-022

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 5 Coal Aggregate Bin | **Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1156834.84, E 895413.59 | **Surface Elevation:** 455 ft AMSL

Start Date: 1/8/21 | **End Date:** 1/8/21 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: n/a ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 10 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0	455	0.0-0.5 Gravelly organic soil with little silt and trace sand; maximum grain size 35 mm; 70% coarse, poorly-graded, subrounded gravel; 5% fine, poorly-graded, subrounded sand; 25% fines with high plasticity, no dilatancy, high toughness, medium dry strength; brown, moist, no odor, blocky, weak cementation, weak reaction to HCl; topsoil.	70 / 5 / 25	10YR 5/3	OH			0.0	NYOW-05-SL022-A	
1		0.5-6.0 Well-graded sand with some gravel and trace silt; maximum grain size 35 mm; 40% fine to coarse, well-graded, subangular gravel; 55% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, medium dry strength; weak red / grayish red, dry, no odor, homogeneous, weak cementation, no reaction to HCl; brick/concrete fragments throughout; fill material.	40 / 55 / 5	10R 4/2	SW	R1	90	0.0	NYOW-05-PH022-B	
2								0.0		
3								0.0		
4								0.0		
5	450					R2	63	0.0		
6		6.0-8.5 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	5 / 5 / 90	10YR 5/3	MH			0.0	NYOW-05-PH022-C	
7								0.0		
8								0.0		
9		8.5-10.0 Elastic silt; maximum grain size <1 mm; 0% very fine, poorly-graded, subrounded sand; 100% fines with high plasticity, no dilatancy, medium toughness, medium dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).	0 / 0 / 100	7.5YR 5/2		R3	100	0.0		
10	445	End boring at 10 ft bgs						0.0		
11										
12										

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING LOG

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-023

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc. | **Drilling Company:** Nothnagle Drilling

Inspector: Joseph Maule, PG | **Driller/Foreman:** Jeff Schweitzer

Borehole Location: AOC 5 Coal Aggregate Bin | **Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore

Survey Datum: NAD 1983 State Plane - NY Central | **Rig Type:** GeoProbe 6610DT Track Rig

Well Coordinates: N 1156817.42, E 895392.2 | **Surface Elevation:** 452 ft AMSL

Start Date: 1/8/21 | **End Date:** 1/8/21 | **Casing Elevation:** n/a ft AMSL

Depth to Groundwater: 5-10ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 10 ft bgs

Depth to Water and Elapsed Time After Drilling: n/a

Other Water Level Measurements: n/a

Description of Hole: Discrete surface/subsurface soil samples

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % Gravel	Sand	Fines	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Notes
0		0.0-0.3 Gravelly organic soil with little silt and trace sand; maximum grain size 35 mm; 70% coarse, poorly-graded, subrounded gravel; 5% fine, poorly-graded, subangular sand; 25% fines with high plasticity, no dilatancy, high toughness, medium dry strength; brown, moist, no odor, blocky, weak cementation, weak reaction to HCl; topsoil.	70	5	25	10YR 5/3	OH	R1	53	0.0	NYOW-05-SL023-A	
1			70	5	25		GM			0.0		
2	450	0.3-1.5 Silty gravel with trace sand; maximum grain size 35 mm; 70% coarse, poorly-graded, subrounded gravel; 5% fine, poorly-graded, subrounded sand; 25% fines with high plasticity, no dilatancy, high toughness, medium dry strength; brown, moist, no odor, homogeneous, weak cementation, weak reaction to HCl; fill material.								0.0		
3		1.5-5.0 Well-graded sand with some gravel and trace silt; maximum grain size 35 mm; 40% fine to coarse, well-graded, subangular gravel; 55% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, medium dry strength; weak red / grayish red, dry, no odor, homogeneous, weak cementation, no reaction to HCl; brick/concrete fragments throughout; fill material.	40	55	5	10R 4/2	SW			0.0	NYOW-05-PH023-B	
4										0.0		
5		5.0-10.0 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).								0.0		
6								R2	50	0.0		
7	445		5	5	90	10YR 5/3	MH			0.0	NYOW-05-PH023-C	
8										0.0		
9								R3	75	0.0		
10		End boring at 10 ft bgs										
11												
12	440											

Legend: Gravel, Fines, Sand

NOTES:

Horizontal locations collected Jan 2021 by Bluestone Environmental Group using a submeter GNSS receiver (EOS Arrow 100). Vertical elevation are approximate from Z-FEMA Bare Earth DEM (2 Meter) Seneca Watershed 2012 (+/- 3.21 m horizontal, 0.145 m vertical). Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-024

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Joseph Maule, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Aggregate Bin	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156829.42, E 895361.28	**Surface Elevation:** 448.917 ft AMSL
Start Date: 1/8/21 **End Date:** 1/8/21	**Casing Elevation:** 450.064 ft AMSL

Depth to Groundwater: 15.5ft bgs | **Depth to Bedrock:** n/a ft bgs | **Depth Drilled into Rock:** n/a ft | **Total Depth:** 22 ft bgs

Depth to Water and Elapse Time After Drilling: 7.51 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 12 to 22 ft bgs

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
0	450	0-1 Sandy organic soil with some gravel and trace silt; maximum grain size 21 mm; 40% fine to coarse, well-graded, angular gravel; 50% fine to coarse, well-graded, angular sand; 10% non-plastic fines with rapid dilatancy, high toughness, medium dry strength; black, dry, no odor, blocky, weak cementation, no reaction to HCl; coal dust; topsoil.	40 / 50 / 10	N1	OL	R1		0.0	NYOW-05-SL024-A	Top of Casing 1.1 ft; Ground Surface
1		1-4 Well-graded sand with some gravel and trace silt; maximum grain size 35 mm; 40% fine to coarse, well-graded, subangular gravel; 55% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, medium dry strength; weak red / grayish red, dry, no odor, homogeneous, weak cementation, no reaction to HCl; brick/concrete fragments throughout; fill material.	40 / 55 / 5	10R 4/2	SW			0.0	NYOW-05-PH024-B	
2								0.0		
3								0.0		
4	445	4-9 Elastic silt; maximum grain size <1 mm; 0% very fine, poorly-graded, subrounded sand; 100% fines with high plasticity, no dilatancy, medium toughness, medium dry strength; brown, moist, no odor, laminated, weak cementation, no reaction to HCl; orange redoximorphic laminations (<3 mm thick) throughout; lacustrine (Psc).						0.0		
5										Bentonite Seal

Grain Size Legend

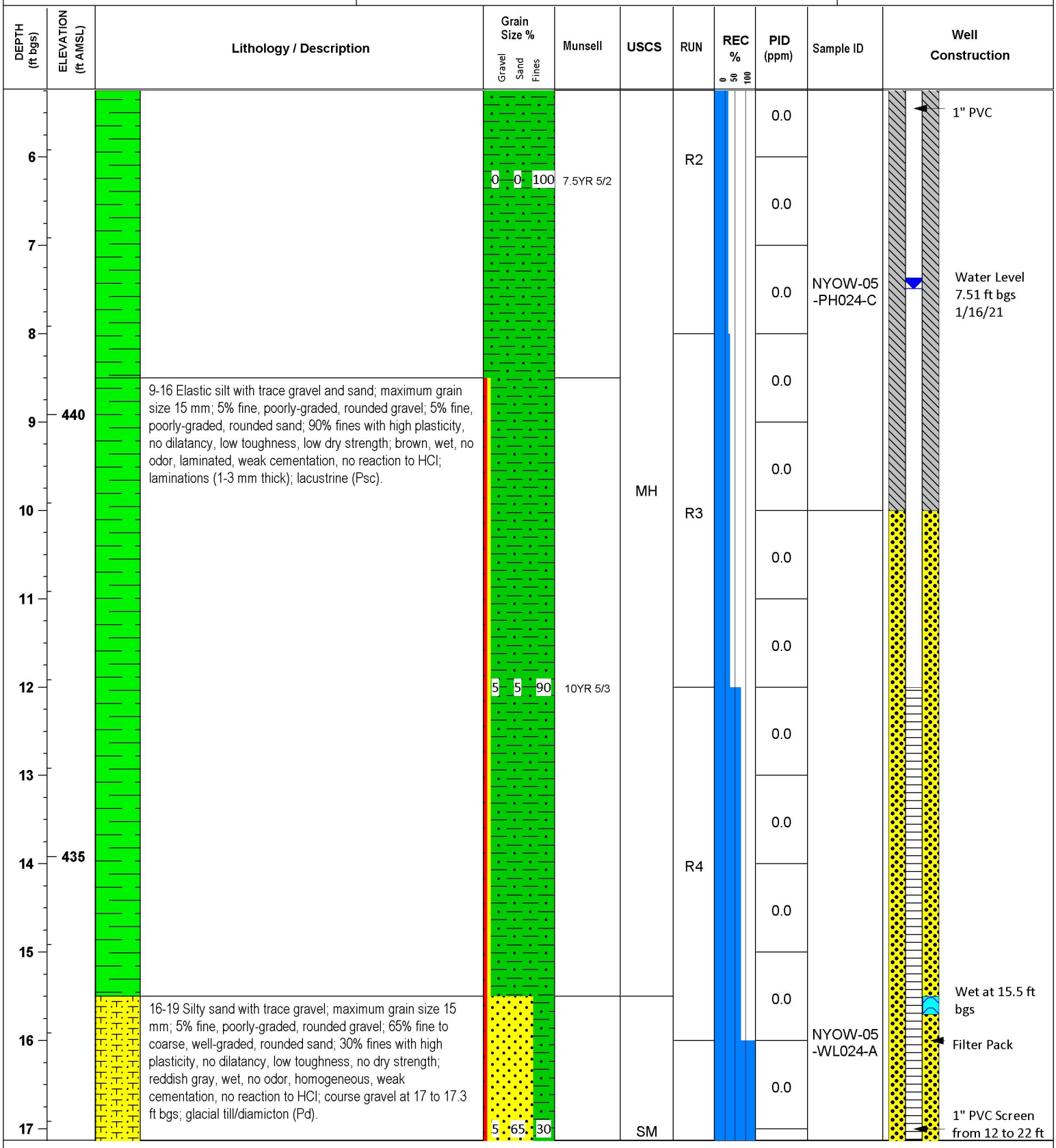
- Gravel
- Sand
- Silt

NOTES:

Water Level on 1/16/21 = 8.61 ft btoc = 7.51 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-024

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level on 1/16/21 = 8.61 ft btoc = 7.51 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-024

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size % (Gravel / Sand / Fines)	Munsell	USCS	RUN	REC % (0 50 100)	PID (ppm)	Sample ID	Well Construction
18						R5		0.0		bgs
19	430	19-22 Well-graded sand with some gravel and trace silt; maximum grain size 7 mm; 30% fine, poorly-graded, subangular gravel; 65% fine to coarse, well-graded, subangular sand; 5% non-plastic fines with rapid dilatancy, low toughness, low dry strength; reddish gray, wet, no odor, homogeneous, weak cementation, no reaction to HCl; glacial till/diamicton (Pd).	30 / 65 / 5	10R 5/1	SW			0.0		
20								0.0		
21						R6		0.0		
22		Refusal at 22 ft bgs						0.0		
23										
24	425									
25										
26										
27										
28										
29	420									

Grain Size Legend

- Gravel
- Sand
- Silt

NOTES:

Water Level on 1/16/21 = 8.61 ft btoc = 7.51 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined in the field.

SOIL BORING/PIEZOMETER LOG

Project: Former NY Ordnace Works, Baldwinsville, NY		**Borehole ID:** NYOW-05-025
Client: USACE CENAE	**Project Number:** W912WJ-19-D-0001, W912WJ19F0056	**Date:** 3/8/21 (Revised)

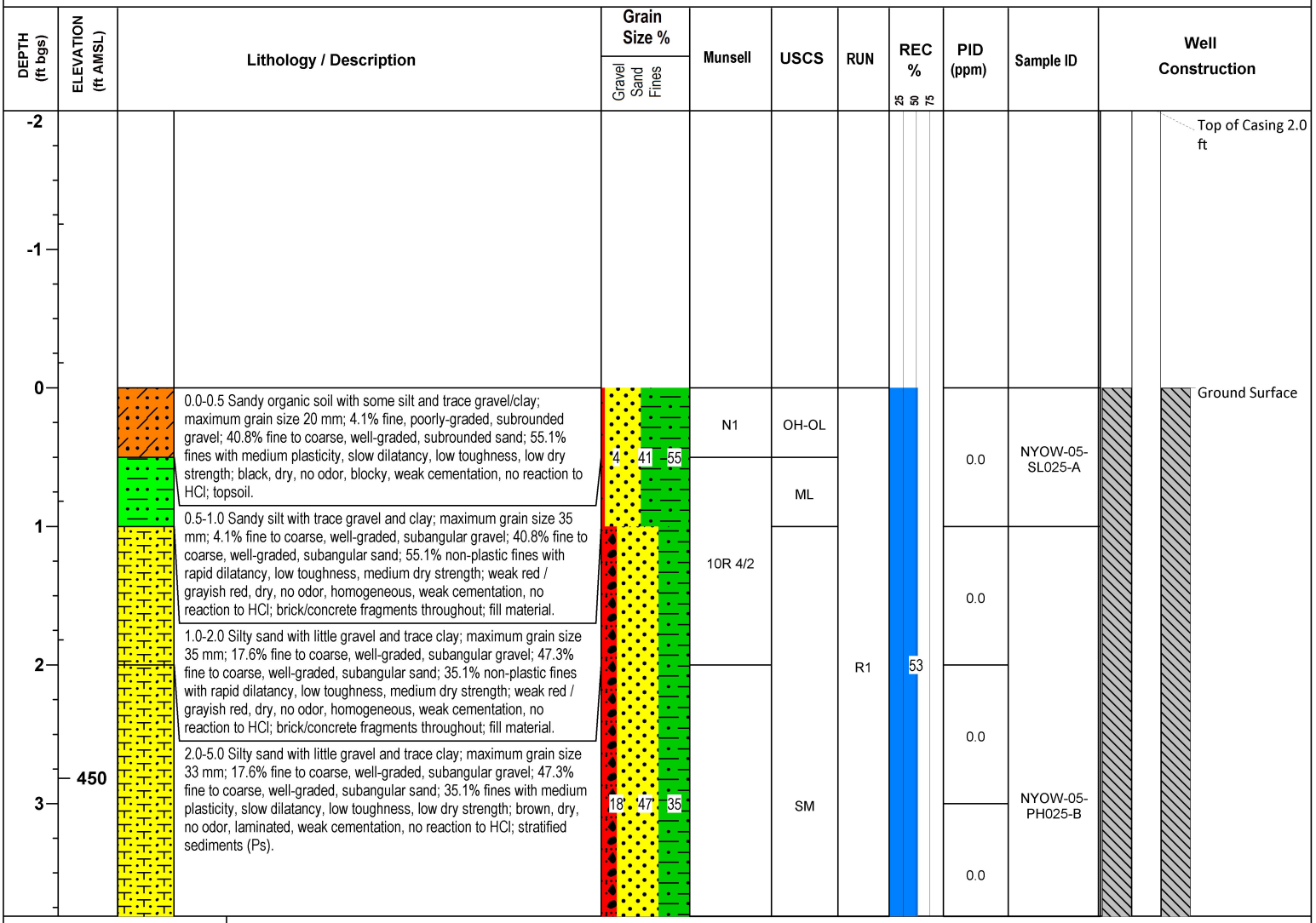
Company Name: Bluestone Environmental Group, Inc.	**Drilling Company:** Nothnagle Drilling
Inspector: Ethan Magee, PG	**Driller/Foreman:** Jeff Schweitzer
Borehole Location: AOC 5 Coal Aggregate Bin	**Drill Method:** DPT: 3-inch diameter, 4 ft long MacroCore
Survey Datum: NAD 1983 State Plane - NY Central	**Rig Type:** GeoProbe 6610DT Track Rig
Well Coordinates: N 1156710.38, E 895414.42	**Surface Elevation:** 452.818 ft AMSL
Start Date: 1/11/21 **End Date:** 1/11/21	**Casing Elevation:** 454.992 ft AMSL

Depth to Groundwater: 8 ft bgs	**Depth to Bedrock:** n/a ft bgs	**Depth Drilled into Rock:** n/a ft	**Total Depth:** 22 ft bgs

Depth to Water and Elapsed Time After Drilling: 6.82 ft bgs on 1/16/21

Other Water Level Measurements: n/a

Description of Hole: 1-inch PVC Temporary Monitoring Well; 0.01-inch screen from 12 to 22 ft bgs



Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 8.82 ft btoc = 6.82 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-025

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)

DEPTH (ft bgs)	ELEVATION (ft AMSL)	Lithology / Description	Grain Size %	Munsell	USCS	RUN	REC %	PID (ppm)	Sample ID	Well Construction
4				10YR 5/3				0.0		
5		5.0-6.0 Elastic silt with trace gravel, trace sand, and little clay; maximum grain size 33 mm; 0.4% fine to coarse, well-graded, subangular gravel; 13.4% fine to coarse, well-graded, subangular sand; 86.2% fines with medium plasticity, slow dilatancy, low toughness, low dry strength; brown, dry, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).			MH			0.0		1" PVC Bentonite Seal
6		6.0-8.0 Silt with trace gravel, trace sand, and little clay; maximum grain size 35 mm; 0.4% fine to coarse, well-graded, subangular gravel; 13.4% fine to coarse, well-graded, subangular sand; 86.2% non-plastic fines with rapid dilatancy, low toughness, medium dry strength; weak red / grayish red, dry, no odor, weak cementation, no reaction to HCl; lacustrine (Psc).				R2	100	0.0		
7			0 13 86	10R 4/2	ML			0.0	NYOW-05-PH025-C	Water Level 6.82 ft bgs 1/16/21
	445							0.0		
8		8.0-10.0 Elastic silt with trace gravel, trace sand, and little clay; maximum grain size 15 mm; 0.4% fine, poorly-graded, rounded gravel; 13.4% fine, poorly-graded, rounded sand; 86.2% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).						0.0		Wet at 8 to 14.5 ft bgs
9								0.0		
10		10.0-14.5 Elastic silt with trace gravel and sand; maximum grain size 15 mm; 5% fine, poorly-graded, rounded gravel; 5% fine, poorly-graded, rounded sand; 90% fines with high plasticity, no dilatancy, low toughness, low dry strength; brown, wet, no odor, laminated, weak cementation, no reaction to HCl; laminations (1-3 mm thick); lacustrine (Psc).				R3	100	0.0		
11				10YR 5/3				0.0		
12			5 5 90					0.0		
	440									
13					MH					

Legend

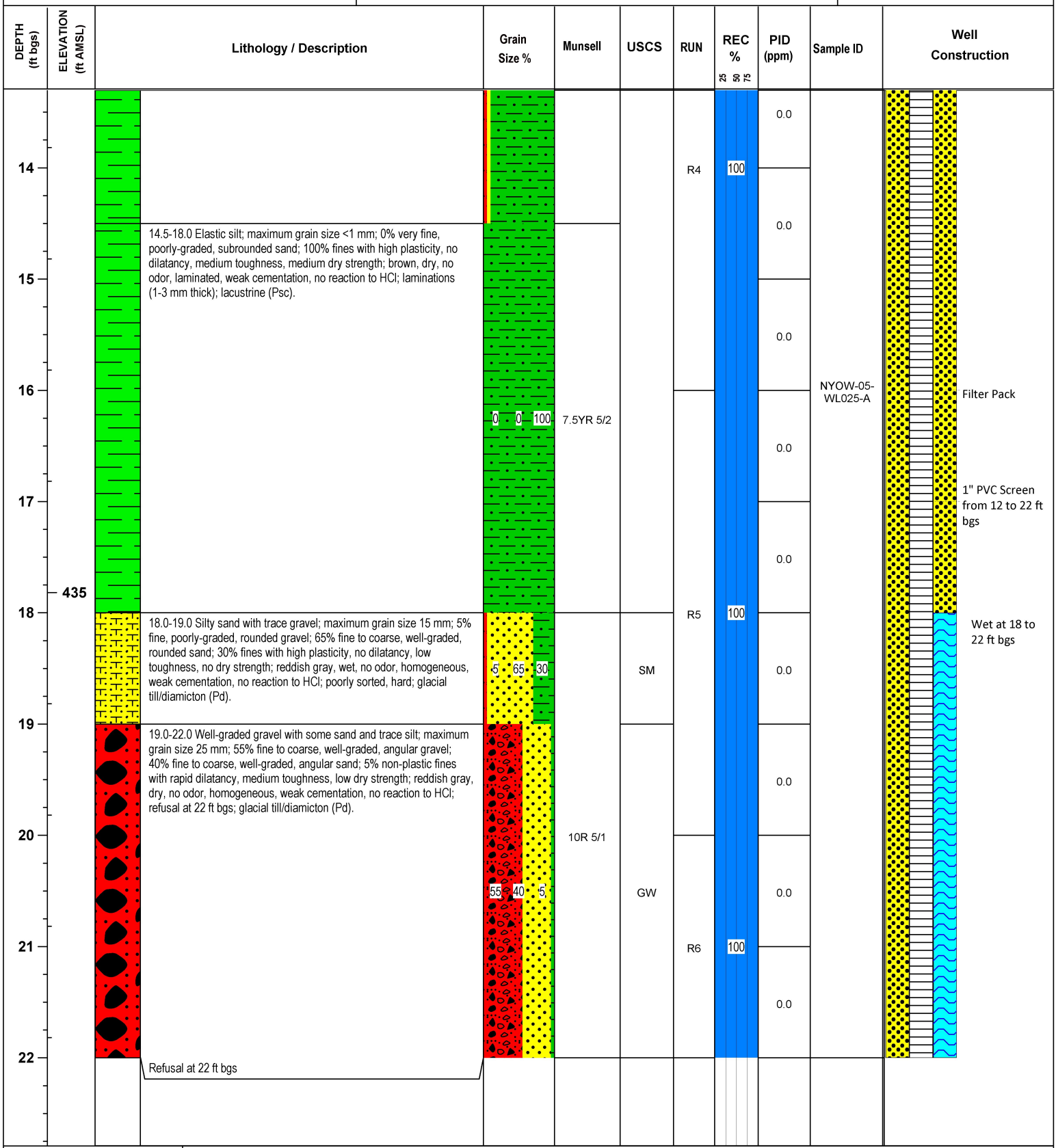
Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 8.82 ft btoc = 6.82 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

Project: Former NY Ordnace Works, Baldwinsville, NY | **Borehole ID:** NYOW-05-025

Client: USACE CENAE | **Project Number:** W912WJ-19-D-0001, W912WJ19F0056 | **Date:** 3/8/21 (Revised)



Legend

Gravel, Fines, Sand, Water Level, Bentonite, Screen, Aquifer

NOTES:

Water Level on 1/16/21 = 8.82 ft btoc = 6.82 ft bgs. Horizontal location and vertical elevations surveyed April 2021 by Colliers Engineering. Drilling logs are in accordance with USACE EM 1110-1-4000 and soil descriptions are in accordance with ASTM 2488-17. Grain size percentages were determined using lab method D422 including hydrometer.

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APPENDIX H

Groundwater Monitoring Well Purging and Sampling Logs

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Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-001	Sample ID: NYOW-04-WL001-A	Date: 2/5/21



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.7	Top of Well Screen Depth bgs (feet): 7.00	Bottom of Well Screen Depth bgs (feet): 17.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.98		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 16.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	19.70	feet	-	3.98	feet	X	0.15	Liters/ foot	= 2.36 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:10	--	3.98	--	--	--	--	--	--	--	Tubing water volume (L) = 0.15
8:29	0.3	3.98	8.7	7.96	65.4	1.311	95.76	8.04	200	Flow cell water volume (L) = 0.2
Sample										
8:29	0.3	3.98	8.7	7.96	65.4	1.311	95.76	8.04	200	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	6	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	6	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 8:30					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): Y					
MS/MSD Sample ID: NYOW-04-WL001-A					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-002	Sample ID:	NYOW-04-WL002-A
Date:	2/1/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.7	Top of Well Screen Depth bgs (feet): 4.00	Bottom of Well Screen Depth bgs (feet): 12.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 6.32		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 10.50

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	14.67	feet	-	6.32	feet	X	0.15 Liters/foot	= 1.25 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
11:06	--	6.32	--	--	--	--	--	--	--	Tubing water volume (L) = 0.10
11:14	0.3	6.32	10.9	7.98	65.4	0.956	453.76	7.65	300	Flow cell water volume (L) = 0.2
Sample										
11:14	0.3	6.32	10.9	7.98	65.4	0.956	453.76	7.65	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 11:15					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-003	Sample ID:	NYOW-04-WL003-A
Date:	2/5/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.8	Top of Well Screen Depth bgs (feet): 6.00	Bottom of Well Screen Depth bgs (feet): 16.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.67		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 16.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	18.80	feet	-	5.67	feet	X	0.15 Liters/ foot	= 1.97 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
9:30	--	5.67	--	--	--	--	--	--	--	Tubing water volume (L) = 0.15
9:49	0.3	5.67	8.6	8.11	43.6	1.287	43.86	7.88	250	Flow cell water volume (L) = 0.2
Sample										
9:49	0.3	5.67	8.6	8.11	43.6	1.287	43.86	7.88	250	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 9:50					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-004	Sample ID:	NYOW-04-WL004-A
Date:	2/1/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.7	Top of Well Screen Depth bgs (feet): 6.00	Bottom of Well Screen Depth bgs (feet): 16.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.11		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 14.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	18.65	feet	-	5.11	feet	X	0.15 Liters/foot	= 2.03 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
12:00	--	5.11	--	--	--	--	--	--	--	Tubing water volume (L) = 0.14
12:04	0.3	5.11	11.0	8.30	2.4	0.910	10.80	8.76	250	Flow cell water volume (L) = 0.2
Sample										
12:04	0.3	5.11	11.0	8.30	2.4	0.910	10.80	8.76	250	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	4	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	4	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 12:05					
QC Samples					
Duplicate (Y/N): Y					
Duplicate Sample ID: WL-DUP-002_210201					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-005	Sample ID:	NYOW-04-WL005-A
Date:	2/1/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.7	Top of Well Screen Depth bgs (feet): 7.00	Bottom of Well Screen Depth bgs (feet): 17.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.72		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 13.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	19.70	feet	-	5.72	feet	X	0.15 Liters/foot	= 2.10 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
13:10	--	5.72	--	--	--	--	--	--	--	Tubing water volume (L) = 0.13
13:14	0.3	5.72	11.9	7.73	-29.0	1.110	1000.00	7.86	250	Flow cell water volume (L) = 0.2
Sample										
13:14	0.3	5.72	11.9	7.73	-29.0	1.110	1000.00	7.86	250	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 13:15					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-006	Sample ID:	NYOW-04-WL006-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.9	Top of Well Screen Depth bgs (feet): 4.00	Bottom of Well Screen Depth bgs (feet): 12.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.14		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 10.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	14.90	feet	-	3.14	feet	X	0.15	Liters/ foot	= 1.76 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:10	--	3.14	--	--	--	--	--	--	--	Tubing water volume (L) = 0.10
8:19	0.3	3.14	8.0	8.06	166.0	1.183	65.97	8.76	250	Flow cell water volume (L) = 0.2
Sample										
8:19	0.3	3.14	8.0	8.06	166.0	1.183	65.97	8.76	250	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA		MnO4 (mg/L): NA	
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 21150		
		Notes:			

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 8:20					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-036	Sample ID:	NYOW-04-WL036-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.8	Top of Well Screen Depth bgs (feet): 5.50	Bottom of Well Screen Depth bgs (feet): 15.50
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.47		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 16.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	18.30	feet	-	3.47	feet	X	0.15 Liters/ foot	= 2.22 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
12:10	--	3.47	--	--	--	--	--	--	--	Tubing water volume (L) = 0.15
12:19	0.3	3.47	7.7	8.34	-95.4	0.924	89.76	7.64	300	Flow cell water volume (L) = 0.2
Sample										
12:19	0.3	3.47	7.7	8.34	-95.4	0.924	89.76	7.64	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 12:20					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-037	Sample ID:	NYOW-04-WL037-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.4	Top of Well Screen Depth bgs (feet): 3.00	Bottom of Well Screen Depth bgs (feet): 13.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.42		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 12.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	15.40	feet	-	3.42	feet	X	0.15 Liters/ foot	= 1.80 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
10:45	--	3.42	--	--	--	--	--	--	--	Tubing water volume (L) = 0.12
10:49	0.3	3.42	9.5	7.98	54.0	1.311	86.97	8.88	300	Flow cell water volume (L) = 0.2
11:00	Only one bottle was collected for SVOC and Explosives sampling, respectively. Well appears to recharge slowly.									
Sample										
10:49	0.3	3.42	9.5	7.98	54.0	1.311	86.97	8.88	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 21150
		Notes: Only one bottle was collected for SVOC and Explosives sampling, respectively. Well appears to recharge slowly.	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	1	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 10:50					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-038	Sample ID:	NYOW-04-WL038-A
Date:	2/5/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.4	Top of Well Screen Depth bgs (feet): 4.0	Bottom of Well Screen Depth bgs (feet): 11.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.19		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 12.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	13.40	feet	-	3.19	feet	X	0.15 Liters/ foot	= 1.53 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
7:30	--	3.19	--	--	--	--	--	--	--	Tubing water volume (L) = 0.12
7:44	0.3	3.19	8.7	7.98	43.9	1.213	96.74	7.54	100	Flow cell water volume (L) = 0.2
8:00	Only one bottle was collected for SVOC and Explosives sampling, respectively. Well appears to recharge slowly.									
Sample										
7:44	0.3	3.19	8.7	7.98	43.9	1.213	96.74	7.54	100	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 21150
		Notes: Only one bottle was collected for SVOC and Explosives sampling, respectively. Well appears to recharge slowly.	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	1	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 7:45					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-079	Sample ID:	NYOW-04-WL079-A
Date:	2/1/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.8	Top of Well Screen Depth bgs (feet): 9.80	Bottom of Well Screen Depth bgs (feet): 19.80
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.34		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 15.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	22.57	feet	-	5.34	feet	X	0.15	Liters/ foot	= 2.58 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
10:20	--	5.34	--	--	--	--	--	--	--	Tubing water volume (L) = 0.14
10:29	0.3	5.34	10.8	7.69	58.8	0.993	19.76	8.31	300	Flow cell water volume (L) = 0.2
Sample										
10:29	0.3	5.34	10.8	7.69	58.8	0.993	19.76	8.31	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	4	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	4	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 10:30					
QC Samples					
Duplicate (Y/N): Y					
Duplicate Sample ID: WL-DUP-001_210201					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-080	Sample ID:	NYOW-04-WL080-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.7	Top of Well Screen Depth bgs (feet): 5.00	Bottom of Well Screen Depth bgs (feet): 15.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.16		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 15.80

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	17.70	feet	-	5.16	feet	X	0.15	Liters/ foot	= 1.88 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
11:20	--	5.16	--	--	--	--	--	--	--	Tubing water volume (L) = 0.15
11:29	0.3	5.16	9.5	8.24	43.6	1.222	765.90	8.96	300	Flow cell water volume (L) = 0.2
Sample										
11:29	0.3	5.16	9.5	8.24	43.6	1.222	765.90	8.96	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 11:30					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-081	Sample ID:	NYOW-04-WL081-A
Date:	2/1/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 3.1	Top of Well Screen Depth bgs (feet): 8.50	Bottom of Well Screen Depth bgs (feet): 18.50
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 4.31		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 15.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	21.64	feet	-	4.31	feet	X	0.15	Liters/ foot	= 2.60 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
9:20	--	4.31	--	--	--	--	--	--	--	Tubing water volume (L) = 0.14
9:29	0.3	4.31	9.5	8.34	97.5	0.856	13.64	7.43	300	Flow cell water volume (L) = 0.2
Sample										
9:29	0.3	4.31	9.5	8.34	97.5	0.856	13.64	7.43	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 9:30					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-082	Sample ID:	NYOW-04-WL082-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 3.3	Top of Well Screen Depth bgs (feet): 5.00	Bottom of Well Screen Depth bgs (feet): 15.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 7.85		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 17.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	18.27	feet	-	7.85	feet	X	0.15 Liters/foot	= 1.56 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
10:15	--	7.85	--	--	--	--	--	--	--	Tubing water volume (L) = 0.16
10:29	0.4	7.85	6.9	7.82	105.7	1.674	543.86	9.65	100	Flow cell water volume (L) = 0.2
10:40	Only one bottle was collected for SVOC and Explosives sampling, respectively. Well appears to recharge slowly.									

Sample

10:29	0.4	7.85	6.9	7.82	105.7	1.674	543.86	9.65	100	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 21150
		Notes: Only one bottle was collected for SVOC and Explosives sampling, respectively. Well appears to recharge slowly.	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	1	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 10:30					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-083	Sample ID:	NYOW-04-WL083-A
Date:	2/1/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 3.3	Top of Well Screen Depth bgs (feet): 10.50	Bottom of Well Screen Depth bgs (feet): 20.50
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 6.06		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 15.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	23.77	feet	-	6.06	feet	X	0.15 Liters/foot	= 2.66 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:50	--	6.06	--	--	--	--	--	--	--	Tubing water volume (L) = 0.14
8:59	0.3	6.06	9.9	8.60	73.0	0.965	36.54	6.54	250	Flow cell water volume (L) = 0.2
Sample										
8:59	0.3	6.06	9.9	8.60	73.0	0.965	36.54	6.54	250	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 9:00					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-084	Sample ID:	NYOW-04-WL084-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 3.0	Top of Well Screen Depth bgs (feet): 9.00	Bottom of Well Screen Depth bgs (feet): 19.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 7.37		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 14.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	22.00	feet	-	7.37	feet	X	0.15	Liters/ foot	= 2.19 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
9:30	--	7.37	--	--	--	--	--	--	--	Tubing water volume (L) = 0.14
9:39	0.3	7.37	8.6	7.57	23.4	1.336	54.87	6.66	250	Flow cell water volume (L) = 0.2
Sample										
9:39	0.3	7.37	8.6	7.57	23.4	1.336	54.87	6.66	250	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron: (mg/L) NA	MnO4: (mg/L) NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 21150
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 9:40					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-04-085	Sample ID:	NYOW-04-WL085-A
Date:	2/4/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.9	Top of Well Screen Depth bgs (feet): 3.50	Bottom of Well Screen Depth bgs (feet): 10.50
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.56		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 10.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	13.40	feet	-	5.56	feet	X	0.15	Liters/ foot	= 1.18 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:40	--	5.56	--	--	--	--	--	--	--	Tubing water volume (L) = 0.10
8:49	0.3	5.56	6.8	7.69	142.0	1.284	43.98	7.99	300	Flow cell water volume (L) = 0.2
Sample										
8:49	0.3	5.56	6.8	7.69	142.0	1.284	43.98	7.99	300	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
		WQ Meter Type: Horiba U-52	Serial #: 21150
Color: Cloudy	Odor: None	Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	1L Amber	N	No Pres.	DNCB and 2,4-DNP
	2	500-ml Amber	N	No Pres.	Picric Acid
Sample Time (1 min after final purge): 8:50					
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-001	Sample ID: NYOW-05-WL001-A	Date: 1/13/21



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.4	Top of Well Screen Depth bgs (feet): 11.00	Bottom of Well Screen Depth bgs (feet): 21.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 4.48		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 20.34

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	22.34	feet btoc	-	4.48	feet btoc	X	0.15	Liters/ foot	=	2.68 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
9:25	--	4.48	--	--	--	--	--	--	--	Tubing water volume (L) = 0.20
9:29	0.4	4.48	5.9	8.88	-43.6	0.596	443.00	4.75	100	Flow cell water volume (L) = 0.2
Sample										
9:29	0.4	4.48	5.9	8.88	-43.6	0.596	443.00	4.75	100	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	3	500-ml Plastic	Y	HNO3	Disolved Metals
	9	40-ml VOA	N	HCl	VOCs
Sample Time (1 min after final purge): 9:30	6	250-ml Amber	N	No Pres.	PAHs
	6	1L Amber	N	No Pres.	SVOCs
	6	1L Amber	N	No Pres.	1,1-Biphenyl
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): Y					
MS/MSD Sample ID: NYOW-05-WL001-A					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-004	Sample ID:	NYOW-05-WL004-A
Date:	1/14/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.9	Top of Well Screen Depth bgs (feet): 12.00	Bottom of Well Screen Depth bgs (feet): 22.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 1.89		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 20.65

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	23.54	feet btoc	-	1.89	feet btoc	X	0.15	Liters/ foot	= 3.25 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:10	--		--	--	--	--	--	--	--	Tubing water volume (L) = 0.20
8:14	0.4	2.99	3.5	8.41	-440.0	0.913	197.00	5.87	100	Flow cell water volume (L) = 0.2
Sample										
8:14	0.4	2.99	3.5	8.41	-440.0	0.913	197.00	5.87	100	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4 (mg/L): NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	6	40-ml VOA	N	HCl	VOCs
	2	500-ml Plastic	Y	HNO3	Disolved Metals
Sample Time (1 min after final purge): 8:15	4	250-ml Amber	N	No Pres.	PAHs
	4	1L Amber	N	No Pres.	SVOCs
	4	1L Amber	N	No Pres.	1,1-Biphenyl
QC Samples					
Duplicate (Y/N): Y					
Duplicate Sample ID: WL-DUP-001_210114					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-005	Sample ID:	NYOW-05-WL005-A
Date:	1/14/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.5	Top of Well Screen Depth bgs (feet): 11.00	Bottom of Well Screen Depth bgs (feet): 21.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.65		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 21.65

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	22.65	feet btoc	-	3.65	feet btoc	X	0.15	Liters/ foot	= 2.85 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
9:15	--	3.65	--	--	--	--	--	--	--	Tubing water volume (L) = 0.21
9:29	0.4	3.65	4.8	8.20	-448.0	1.140	214.76	8.54	100	Flow cell water volume (L) = 0.2
Sample										
9:29	0.4	3.65	4.8	8.20	-448.0	1.140	214.76	8.54	100	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	500-ml Plastic	Y	HNO3	Disolved Metals
	3	40-ml VOA	N	HCl	VOCs
Sample Time (1 min after final purge): 9:30	2	250-ml Amber	N	No Pres.	PAHs
	2	1L Amber	N	No Pres.	SVOCs
	2	1L Amber	N	No Pres.	1,1-Biphenyl
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-05-006	Sample ID: NYOW-05-WL006-A	Date: 1/11/21



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.1	Top of Well Screen Depth bgs (feet): 13.00
Bottom of Well Screen Depth bgs (feet): 23.00		
Well Type: Stick Up	Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 5.95	Pump or Bailer Type: PP	Pump Inlet below MP (feet): 19.09

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	24.19	feet btoc	-	5.95	feet btoc	X	0.15	Liters/ foot	=	2.74 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:31	--	5.95	--	--	--	--	--	--	--	Tubing water volume (L) = 0.18
12:30	0.4	5.95	8.3	7.81	-259.2	1.132	1000.00	1.79		Flow cell water volume (L) = 0.2
Sample										
12:30	0.4	5.95	8.3	7.81	-259.2	1.132	1000.00	1.79		

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Clear	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	500-ml Plastic	Y	HNO3	Disolved Metals
	2	1L Amber	N	No Pres.	SVOCs
Sample Time (1 min after final purge): 12:44	2	250-ml Amber	N	No Pres.	PAHs
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-05-008	Sample ID:	NYOW-05-WL008-A
Date:	1/11/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.1	Top of Well Screen Depth bgs (feet): 9.00	Bottom of Well Screen Depth bgs (feet): 19.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 1.93		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 15.18

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	20.28 feet btoc	-	1.93 feet btoc	X	0.15 Liters/ foot	=	2.75	Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:04	--	1.93	--	--	--	--	--	--	--	Tubing water volume (L) = 0.15
8:15	0.3	1.93	8.9	7.21	-61.0	1.130	30.20	1.98	100	Flow cell water volume (L) = 0.2
Sample										
8:15	0.3	1.93	8.9	7.21	-61.0	1.130	30.20	1.98	100	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	500-ml Plastic	Y	HNO3	Disolved Metals
	2	250-ml Amber	N	No Pres.	PAHs
Sample Time (1 min after final purge): 8:16	2	1L Amber	N	No Pres.	SVOCs
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-05-010	Sample ID:	NYOW-05-WL010-A
Date:	1/12/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.7	Top of Well Screen Depth bgs (feet): 10.38	Bottom of Well Screen Depth bgs (feet): 20.38
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 3.04		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 15.38

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	23.07	feet btoc	-	3.04	feet btoc	X	0.15	Liters/ foot	= 3.00 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
10:46	--	3.04	--	--	--	--	--	--	--	Tubing water volume (L) = 0.15
10:49	0.3	3.04	7.0	8.11	-199.6	0.614	1000.00	0.92	100	Flow cell water volume (L) = 0.2
Sample										
10:49	0.3	3.04	7.0	8.11	-199.6	0.614	1000.00	0.92	100	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Cloudy Brown and highly turbid	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	500-ml Plastic	Y	HNO3	Disolved Metals
	2	1L Amber	N	No Pres.	SVOCs
Sample Time (1 min after final purge): 10:50	2	250-ml Amber	N	No Pres.	PAHs
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-012	Sample ID:	NYOW-05-WL012-A
Date:	1/14/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.1	Top of Well Screen Depth bgs (feet): 16.50	Bottom of Well Screen Depth bgs (feet): 26.50
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 11.93		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 27.14

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	28.14	feet btoc	-	11.93	feet btoc	X	0.15	Liters/ foot	= 2.43 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.5

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
11:40	--	11.93	--	--	--	--	--	--	--	Tubing water volume (L) = 0.26
11:54	0.5	11.93	2.5	8.03	-327.0	1.900	54.87	6.54	100	Flow cell water volume (L) = 0.2
Sample										
11:54	0.5	11.93	2.5	8.03	-327.0	1.900	54.87	6.54	100	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Clear	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	2	500-ml Plastic	Y	HNO3	Disolved Metals
	4	1L Amber	N	No Pres.	SVOCs
Sample Time (1 min after final purge): 11:55	4	250-ml Amber	N	No Pres.	PAHs
QC Samples					
Duplicate (Y/N): Y					
Duplicate Sample ID: WL-DUP-002_210114					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-016	Sample ID:	NYOW-05-WL016-A
Date:	1/15/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.1	Top of Well Screen Depth bgs (feet): 18.00	Bottom of Well Screen Depth bgs (feet): 28.00
Well Type: Stick Up		Well Condition: Good	MP Location: Northside top of casing MP Marked (Y/N): N
Static Depth to Water below MP (feet): 13.42		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 20.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	29.10 feet btoc	-	13.42 feet btoc	X	0.15 Liters/ foot	=	2.35	Liters

Purging Initiated at: 12:00	Purging Ended at: 12:01	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
11:56	--	13.42	--	--	--	--	--	--	--	Tubing water volume (L) = 0.19
12:01	0.4	0.57	8.5	8.04	-230.0	0.386	1000.00	10.59	670	Flow cell water volume (L) = 0.2
Sample										
12:01	0.4	0.57	8.5	8.04	-230.0	0.386	1000.00	10.59	670	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Brown/Orange	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): JM	2	1L Amber	N	No Pres.	SVOCs
	2	250-ml Amber	N	No Pres.	PAHs
Sample Time (1 min after final purge): 12:44	1	500-ml Plastic	Y	HNO3	Disolved Metals
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-017-1	Sample ID:	NYOW-05-WL017-1-A
Date:	1/15/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.1	Top of Well Screen Depth bgs (feet): 18.50	Bottom of Well Screen Depth bgs (feet): 28.50
Well Type: Stick Up		Well Condition: Good	MP Location: Northside top of casing MP Marked (Y/N): N
Static Depth to Water below MP (feet): 13.42		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 20.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	29.64 feet btoc	-	13.42 feet btoc	X	0.15 Liters/ foot	=	2.43	Liters

Purging Initiated at: 12:00	Purging Ended at: 12:01	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
11:45	--	13.42	--	--	--	--	--	--	--	Tubing water volume (L) = 0.19
12:01	0.4	0.57	8.5	8.04	-230.0	0.386	1000.00	10.59	670	Flow cell water volume (L) = 0.2
Sample										
12:01	0.4	0.57	8.5	8.04	-230.0	0.386	1000.00	10.59	670	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Brown/Orange	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): JM	2	1L Amber	N	No Pres.	SVOCs
	2	250-ml Amber	N	No Pres.	PAHs
Sample Time (1 min after final purge): 12:02	1	500-ml Plastic	Y	HNO3	Disolved Metals
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works			Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-019	Sample ID:	NYOW-05-WL019-A	Date:	1/15/21

Photo Not Taken

Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.6	Top of Well Screen Depth bgs (feet): 9.00	Bottom of Well Screen Depth bgs (feet): 19.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): N
Static Depth to Water below MP (feet): 12.58		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 25.00

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	21.51	feet btoc	-	12.58	feet btoc	X	0.15	Liters/ foot	= 1.34 Liters

Purging Initiated at: 12:40	Purging Ended at: 12:41	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
--	--	--	--	--	--	--	--	--	--	Tubing water volume (L) = 0.24
9:24	0.4	16.04	9.4	8.01	-375.0	0.460	1000.00	12.84	670	Flow cell water volume (L) = 0.2
Sample										
9:24	0.4	16.04	9.4	8.01	-375.0	0.460	1000.00	12.84	100	

PID (ppm): 0.0	LNAPL Present: No	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Brown/Orange	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): JM	2	1L Amber	N	No Pres.	SVOCs
	2	250-ml Amber	N	No Pres.	PAHs
Sample Time (1 min after final purge): 9:25	1	500-ml Plastic	Y	HNO3	Disolved Metals
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works	Site Location:	Baldwinsville, New York
Well ID:	NYOW-05-024	Sample ID:	NYOW-05-WL024-A
Date:	1/11/21		



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 1.1	Top of Well Screen Depth bgs (feet): 11.17	Bottom of Well Screen Depth bgs (feet): 21.17
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 8.55		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 16.17

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	22.27	feet btoc	-	8.55	feet btoc	X	0.15	Liters/ foot	= 2.06 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.4

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
8:41	--	8.55	--	--	--	--	--	--	--	Tubing water volume (L) = 0.16
11:20	0.4	8.55	8.2	7.52	-156.0	1.600	469.00	2.89	200	Flow cell water volume (L) = 0.2
Sample										
11:20	0.4	8.55	8.2	7.52	-156.0	1.600	469.00	2.89	200	

PID (ppm): 0.0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Clear	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	500-ml Plastic	Y	HNO3	Disolved Metals
	2	250-ml Amber	N	No Pres.	PAHs
Sample Time (1 min after final purge): 11:20	2	1L Amber	N	No Pres.	SVOCs
QC Samples					
Duplicate (Y/N): N					
Duplicate Sample ID:					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

Groundwater Monitoring Well Purging and Sampling Log

Site Name:	Former New York Ordnance Works			Site Location:	Lysander, Onondaga County, New York
Well ID:	NYOW-05-025	Sample ID:	NYOW-05-WL025-A	Date:	1/12/21



Purging Data

Well Diameter (inches): 1	Casing height ags (feet): 2.0	Top of Well Screen Depth bgs (feet): 12.00	Bottom of Well Screen Depth bgs (feet): 22.00
Well Type: Stick Up		Well Condition: Good	MP Location: PVC MP Marked (Y/N): Y
Static Depth to Water below MP (feet): 8.54		Pump or Bailer Type: PP	Pump Inlet below MP (feet): 13.23

Well Volume Purge: 1 Well Volume = (Total Well Depth - Static Depth to Water) X Well Capacity

1 Well Volume =	23.91	feet btoc	-	8.54	feet btoc	X	0.15	Liters/ foot	=	2.31 Liters

Purging Initiated at: NA	Purging Ended at: NA	Total Volume Purged (liters): 0.3

Well Capacity (Liters Per Foot): 0.75" = 0.076; 1" = 0.15; 1.25" = 0.23; 2" = 0.61; 3" = 1.40; 4" = 2.46; 5" = 3.86; 6" = 5.56; 12" = 22.26

Purging Equipment Codes: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

Time	Cumulative Volume Purged (liters)	Depth to Water below MP +/- 0.3 (feet)	Temperature +/-3% (°C)	pH +/- 0.1	Field-Measured ORP +/- 10 (mV)	Sp. Conductivity (mS/cm) +/- 3%	Turbidity +/-10% (NTU) or <5	DO +/- 10% (mg/L) or <0.5	Flow Rate (ml/min)	Notes
11:49	--	8.54	--	--	--	--	--	--	--	Tubing water volume (L) = 0.13
11:54	0.3	8.54	6.5	7.39	-456.0	0.950	215.54	3.24	100	Flow cell water volume (L) = 0.2
12:00	Well goes dry. Wait 15 minutes for recharge then continue sampling.									
12:15	Well goes dry. Wait 15 minutes for recharge then continue sampling.									
12:30	Well goes dry. Wait 15 minutes for recharge then continue sampling.									
12:45	Well goes dry. Wait 15 minutes for recharge then continue sampling.									
13:00	Well goes dry. Wait 15 minutes for recharge then continue sampling.									
Sample										
11:54	0.3	8.54	6.5	7.39	-456.0	0.950	215.54	3.24	100	

PID (ppm): 0?0	LNAPL Present: None	Ferrous Iron (mg/L): NA	MnO4: (mg/L) NA
Color: Cloudy	Odor: None	WQ Meter Type: Horiba U-52	Serial #: 48804
		Notes:	

Sampling Data

	Bottle Quantity	Container Type	Filtered (Y/N)	Sample Pres.	Analytical
Sampled By (Initials Only): SG	1	500-ml Plastic	Y	HNO3	Disolved Metals
	2	250-ml Amber	N	No Pres.	PAHs
Sample Time (1 min after final purge): 11:55	2	1L Amber	N	No Pres.	SVOCs
QC Samples					
Duplicate (Y/N): Y					
Duplicate Sample ID: WL-DUP-001_210112					
MS/MSD (Y/N): N					
MS/MSD Sample ID:					

bgs = below ground surface; ags = above ground surface; MP = measuring point; WQ = water quality.

APPENDIX I

Chains of Custody

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Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225

eurofins Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No: 1 of 2, #1
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah)	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle)	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-SL010-A	1/7/21	0930	G	S	N	N	1					1					✓			2	
NYOW-05-PH010-B	1/7/21	0935	G	S	N	N	1				1	1					✓			3	
NYOW-05-PH010-C	1/7/21	0940	G	S	N	N	1				1	1					✓			3	
NYOW-05-SL009-A	1/7/21	1030	G	S	N	N	1					1					✓			2	
NYOW-05-PH009-B	1/7/21	1035	G	S	N	N	1				1	1					✓			3	
NYOW-05-PH009-C	1/7/21	1040	G	S	N	N	1				1	1					✓			3	
NYOW-05-SL008-A	1/7/21	1150	G	S	N	N	1					1					✓			2	
NYOW-05-PH008-B	1/7/21	1155	G	S	N	N	1				1	1					✓			3	
NYOW-05-PH008-C	1/7/21	1200	G	S	N	N	1				1	1					✓			3	
NYOW-05-SL007-A	1/7/21	~~1140~~ 1440	G	S	N	N	1		SG	1/7/21		1					✓			2	
NYOW-05-PH007-B	1/7/21	1445	G	S	N	N	1				1	1					✓			3	

280-144370 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	[signature]	1/7/21 1600	Bluestone	[signature]	1-7-21, 1600	Eyn
2	[signature]	1-7-21, 1900	Eyn	Scott Hall	1/8/21 0945	ETA Denver
3						

Custody Seals Intact: ✓ Yes Δ No

Custody Seal No.: 1402365, 1402366

Cooler Temperature(s) °C and Other Remarks: 0.7C, 1.2C CF+0.2C IR#9

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225 eurofins Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No: 2 of 2, #1
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah)	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle)	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-PH007-C	1/7/21	1450	G	S	N	N	1				1	1					✓			3	
PH-DUP-001_210107	1/7/21	0000	G	S	N	N	1				1	1					✓			3	
EB-01_210107	1/7/21	1515	G	W	N	N	7	1			22						✓			5	

1/7/21

Possible Hazard Identification ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological		**Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)** ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months	
Deliverable Requested: I, II, III, IV, Other (specify)		Special Instructions/QC Requirements:	
Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time: 1/7/21 1600 Company: Bluestone	Received by:	Date/Time: 1-7-21, 1600 Company: Syn
Relinquished by:	Date/Time: 1-7-21, 1900 Company: Syn	Received by:	Date/Time: 1/8/21 0945 Company: ETA Denver
Relinquished by:	Date/Time: Company:	Received by:	Date/Time: Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:	

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

280-144465 Chain of Custody

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422 Grain Size (ETA Seattle)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
NYOW-05-SL006-A	1/8/21	0900	G	S	N	N	1	1	
NYOW-05-PH006-B	1/8/21	0905	G	S	N	N	1	1	
NYOW-05-PH006-C	1/8/21	0910	G	S	N	N	1	1	
NYOW-05-SL021-A	1/8/21	1320	G	S	N	N	1	1	
NYOW-05-PH021-B	1/8/21	1325	G	S	N	N	1	1	
NYOW-05-PH021-C	1/8/21	1330	G	S	N	N	1	1	

1/8/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	1/8/21 1600	Bluestone	Received by:	1/8/21 1600	ES-SYR
Relinquished by:	1-8-21, 1900	Syr	Received by: FEDEX	1-8-21, 1905	FEDEX
Relinquished by:	Date/Time:	Company	Received by:	1/9/21 0925	ETADEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 1402373, 1402371, 1402372

Cooler Temperature(s) °C and Other Remarks: 0.6C, 0.7C, 0.7C IR#9CF+0.2

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s): Syracuse	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested #225

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) SG 1/14/21	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-SL006-A	1/8/21	0900	G	S	N	N	1				1	1	1		1		✓			4	
NYOW-05-PH006-B	1/8/21	0905	G	S	N	N	1				1	1	1		1		✓			5	
NYOW-05-PH006-C	1/8/21	0910	G	S	N	N	1				1	1	1		1		✓			5	
NYOW-05-SL024-A	1/8/21	1130	G	S	N	N	1				1	1	1		1		✓			2	
NYOW-05-PH024-B	1/8/21	1135	G	S	N	N	1				1	1	1		1		✓			3	
NYOW-05-PH024-C	1/8/21	1140	G	S	N	N	1				1	1					✓			3	
NYOW-05-SL023-A	1/8/21	1230	G	S	N	N	1				1	1					✓			2	
NYOW-05-PH023-B	1/8/21	1235	G	S	N	N	1				1	1					✓			3	
NYOW-05-PH023-C	1/8/21	1240	G	S	N	N	1				1	1					✓			3	
SL-DUP-001_210108	1/8/21	0000	G	S	N	N	1					1					✓			2	
NYOW-05-SL022-A	1/8/21	1250	G	S	N	Y	3					3					✓			6	

280-144466 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/8/21 1600	Bluestone		1/8/21 1600	ES-SYR
2		1-8-21, 1900	SYR	FEDEX	1-8-21, 1905	FEDEX
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 1/9/21 0925	Company: ETDEN

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 140372, 140373, 140371
Cooler Temperature(s) °C and Other Remarks: 0.6, 0.7C, 0.7C IR#9 CF+0.2

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information
Client Contact: Lori Paolella
Company: Bluestone Environmental Group Inc
Address: 301 Lindenwood Drive
City: Malvern
State, Zip: PA, 19355
Phone: (610) 647-9500 x.1028
Email: lpaolella@bluestoneenviro.com
Project Name: NYOW AOC5
Site: Baldwinsville, New York

Sampler: Joe Maule
Phone: (610) 647-9500 x.1028
PWSID:
Due Date Requested:
TAT Requested (days): 15 business day
Compliance Project: Δ Yes Δ No
PO #:
WO #:
Project #: W912WJ.19D0001.19F0056.0400 L
SSOW#:

Lab PM: McEntee, Patrick J
E-Mail: Patrick.McEntee@Eurofinset.com
Carrier Tracking No(s): Syracuse #225
State of Origin: NY

COC No:
Page: 2 of 2
Job #: W912WJ.19D0001.19F0056.0400.L

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) 36 1/8/21	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture		Total Number of containers
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N		
NYOW-05-PH022-B	1/8/21	1255	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
NYOW-05-PH022-C	1/8/21	1300	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
PH-DUP-001_210108	1/8/21	0000	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
NYOW-05-SL021-A	1/8/21	1320	G	S	N	N	1	—	—		—	1	—		—		✓	—	2
NYOW-05-PH021-B	1/8/21	1325	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
NYOW-05-PH021-C	1/8/21	1330	G	S	N	Y	3	—	—		3	3	—		—		✓	—	9
NYOW-05-SL020-A	1/8/21	1420	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
NYOW-05-PH020-B	1/8/21	1425	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
NYOW-05-PH020-C	1/8/21	1430	G	S	N	N	1	—	—		1	1	—		—		✓	—	3
EB-01_210108	1/8/21	1500	G	W	N	N	—	1	—	—	2	2	—		—		—	—	5
																			SA 1/8/21

Preservation Codes:
A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify); Other:

Special Instructions/Note:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	1/8/21 1600	Bluestone	Received by:	1/8/21 1600	ES-SYR
Relinquished by:	1-8-21, 1900	SYR	Received by: FEDEX	1-8-21, 1905	FEDEX
Relinquished by:			Received by:	1/9/21 0925	EDEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins Environment Testing America

Carrier Tracking No(s): Syracuse #225

COC No:

Page: 1 of 2

Job #: W912WJ.19D0001.19F0056.0400.L

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	State of Origin: NY
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	
Company: Bluestone Environmental Group Inc	PWSID:		
Address: 301 Lindenwood Drive	Due Date Requested:		
City: Malvern	TAT Requested (days): 15 business day		
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No		
Phone: (610) 647-9500 x.1028	PO #:		
Email: lpaolella@bluestoneenviro.com	WO #:		
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L		
Site: Baldwinsville, New York	SSOW#:		

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Special Instructions/Note:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL 1.5+	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) SS 1/11/21	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture			Total Number of containers
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N			
NYOW-05-WL008-A	1/11/21	0816	G	W	Y	N	—	1	—	—	2	2	—	—	—	—	—	—	—	5
NYOW-05-WL006-A	1/11/21	1230	G	W	Y	N	—	1	—	—	2	2	—	—	—	—	—	—	—	5
NYOW-05-WL024-A	1/11/21	1120	G	W	Y	N	—	1	—	—	2	2	—	—	—	—	—	—	—	5
EB-OL-210111	1/11/21	1420	G	W	Y	N	—	1	—	—	2	2	—	—	—	—	—	—	—	5
NYOW-05-SL025-A	1/11/21	1200	G	S	N	N	1	—	—	—	1	1	1	—	1	—	✓	—	—	4
NYOW-05-PH025-B	1/11/21	1205	G	S	N	N	1	—	—	—	1	1	1	—	1	—	✓	—	—	5
NYOW-05-PH025-C	1/11/21	1210	G	S	N	N	1	—	—	—	1	1	1	—	1	—	✓	—	—	5
NYOW-05-SL018-A	1/11/21	1330	G	S	N	N	1	—	—	—	1	1	—	—	—	—	✓	—	—	3
NYOW-05-PH018-B	1/11/21	1335	G	S	N	N	1	—	—	—	1	1	—	—	—	—	✓	—	—	3
NYOW-05-PH018-C	1/11/21	1340	G	S	N	N	1	—	—	—	1	1	—	—	—	—	✓	—	—	3
NYOW-05-SL019-A	1/11/21	1430	G	S	N	N	1	—	—	—	1	1	—	—	—	—	✓	—	—	3

280-144501 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained long
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time: 1/11/21 1600	Company: Bluestone	Received by:	Date/Time: 1/11/21 1600	Company: ES-SYR
Relinquished by: R English	Date/Time: 1-11-21, 19:00	Company: ES-SYR	Received by: FEDEX	Date/Time: 1-11-21 19:00	Company: FEDEX
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 1/12/21 0630	Company: ETADEN

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.: 1402380, 1402381, 1402382

Cooler Temperature(s) °C and Other Remarks: 1.3, 2.3, 0.8 IR#9 CF+0.2

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s): Syracuse	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY #225	Page: 2 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	8422 Grain Size (ETA Seattle) SG 1/11/21	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture		Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N			
~~NYOW-05-PH019-B~~ 891/11/21 NYOW-05-PH019-B	1/11/21	1435	G	S	N	N	1	—	—	1	1	—			—		✓	—	3	
NYOW-05-PH019-C	1/11/21	1440	G	S	N	N	1	—	—	1	1	—			—		✓	—	3	
EB-02_210111	1/11/21	1530	G	W	N	N	—	1	—	2	2	—			—		—	—	5	

1/11/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/11/21 1600	Bluestone		1/11/21 1600	ES-SYR
2		1-11-21, 19:05	Syr	FEDEX	1-11-21, 19:05	FEDEX
3		Date/Time:	Company:		1/12/21, 1030	ETA DEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s): Syracuse #225	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x 1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422 Grain Size (ETA Seattle)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
NYOW-05-SL025-A	1/11/21	1200	G	S	N	N	1		
NYOW-05-PH025-B	1/11/21	1205	G	S	N	N	1		
NYOW-05-PH025-C	1/11/21	1210	G	S	N	N	1		

1/11/21

280-144503 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	1/11/21 1600	Bluestone	[signature]	1/11/21 1600	ES-SKIC
Relinquished by: R English	1-11-21, 19:00	Syr	Fedex	1-11-21, 1905	Fedex
Relinquished by:			[signature]	1/12/21 1030	ETA DEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No: 1402380, 1402381, 1402382 | Cooler Temperature(s) °C and Other Remarks: 1.3, 2.3, 0.8 IR#9 CF+0.8

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 3
Company: Bluestone Environmental Group Inc	PWSID:	Analysis Requested		Job #: W912WJ 19D0001.19F0056.0400.L

Address: 301 Lindenwood Drive
City: Malvern
State, Zip: PA, 19355
Phone: (610) 647-9500 x.1028
Email: lpaolella@bluestoneenviro.com
Project Name: NYOW AOC5
Site: Baldwinsville, New York

280-144550 Chain of Custody

Due Date Requested:
TAT Requested (days): 15 business day
Compliance Project: Δ Yes Δ No
PO #:
WO #:
Project #: W912WJ.19D0001.19F0056.0400.L
SSOW#:

Preservation Codes:
A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) SG 1/12/21	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-SL005-A	1/12/21	0920	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—		8	
NYOW-05-PH005-B	1/12/21	0925	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—		8	
NYOW-05-PH005-C	1/12/21	0930	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—		8	
NYOW-05-WL010-A	1/12/21	1050	G	W	Y	N	—	1	—	—	2	2	—		—	—	—	—		5	
NYOW-05-WL025-A	1/12/21	1155	G	W	Y	N	—	1	—	—	2	2	—		—	—	—	—		5	
~~WL-DUP-001-20~~ SG 1/12/21 210112	1/12/21	0000	G	W	Y	N	—	1	—	—	2	2	—		—	—	—	—		5	SG 1/12/21 sample not taken.
NYOW-05-SL001-A	1/12/21	1300	G	S	N	N	1	—	—	—	1	1	—		—	1	✓	—		4	
NYOW-05-PH001-B	1/12/21	1305	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—		8	
NYOW-05-PH001-C	1/12/21	1310	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—		8	
NYOW-05-SL002-A	1/12/21	1100	G	S	N	N	1	—	—	—	1	1	—		—	1	✓	—		4	
NYOW-05-PH002-B	1/12/21	1105	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—		8	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
	1/12/21 1800	Bluestone		1/13/21 0930	ETADEN
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Relinquished by	Date/Time	Company	Received by	Date/Time	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No: 1448601, 1448635, 1448638, 1448606, 1448597, 1448633
Cooler Temperature(s) °C and Other Remarks: 3.9, 5.4, 4.1, 4.4, 5.7, 1.0 IR#9 CF+0.5

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 3
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x 1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah)	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle)	9081 CEC (ETA Corpus)	8082A PCBs	Percent Moisture			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-PH002-C	1/12/21	1110	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—	—	8	
NYOW-05-SL003-A	1/12/21	1000	G	S	N	Y	3	—	—	—	3	3	3		1	3	✓	—	—	16	
NYOW-05-PH003-B	1/12/21	1005	G	S	N	Y	3	—	12	—	3	3	3		1	3	✓	—	—	28	
NYOW-05-PH003-C	1/12/21	1010	G	S	N	N	1	—	4	—	1	1	1		1	1	✓	—	—	10	
NYOW-05-SL004-A	1/12/21	1400	G	S	N	N	1	—	—	—	1	1	—		—	1	✓	—	—	4	
NYOW-05-PH004-B	1/12/21	1405	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—	—	8	
NYOW-05-PH004-C	1/12/21	1410	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—	—	8	
PH-DUP-001_210112	1/12/21	0000	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—	—	8	
SL-DUP-001_210112	1/12/21	0000	G	S	N	N	1	—	4	—	1	1	—		—	1	✓	—	—	8	
EB-01_210112	1/12/21	1600	G	W	N	N	—	1	—	3	2	2	—		—	2	—	—	—	10	
EB-02_210112	1/12/21	1630	G	W	Y	N	—	1	—	—	2	2	—		—	—	—	—	—	5	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/12/21 1800	Bluestone		1/13/21 0930	EADEN
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☑ Yes Δ No
Custody Seal No: 144860l, 1448635, 1448638, 1448606, 1448597, 1448633

Cooler Temperature(s) °C and Other Remarks: 3.9, 5.4, 4.1, 4.4, 5.7, 1.0 IR#9 CF+0.2

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 3 of 3
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW ACO5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=wasteoil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah)	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle)	9081 CEC (ETA Corpus)	8082A PCBs	Moisture			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
TB-01_210112	1/12/21	0700	G	W	N	N	—			2	—									2	

1/12/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company	Received by	Date/Time	Company
Relinquished by:	1/12/21 1800	Bluestone		1/13/20 0930	ETADEN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

From:	Rachel Urban
To:	McEntee, Patrick; Florence Sevold; Laura Paolella; Molly Horning
Cc:	Mike Badeau; Dylan Kirar
Subject:	RE: ISSUES! Eurofins TestAmerica Sample Login Confirmation files from 280-144550 New York Ordinance Works (NYOW)
Date:	Friday, January 15, 2021 3:52:00 PM

Hi Patrick,

I've just gotten through checking this check-in. NYOW-05-SL005-A (280-144550-1) and SL-DUP-001_210112 (280-144550-19) do not need to be analyzed for VOCs, so the COC was marked incorrectly with additional bottleware. Based on the fact that VOCs were not needed on those two samples, your check-in document matches what we were expecting.

If you or Dylan could confirm that packing/bubble wrap has been sufficient or needs improvement, that would be great. Thank you!

Rachel Urban
Junior Engineer
Bluestone Environmental Group, Inc.
An 8(a), EDWOSB Company
http://www.bluestoneenviro.com
301 Lindenwood Drive, Suite 102, Malvern, PA 19355
Office: 610.647.9500 x1032 | Direct: 484.359.1906 | Mobile: 570.778.8618
Email: rurban@bluestoneenviro.com

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From: McEntee, Patrick <Patrick.McEntee@Eurofinset.com>
Sent: Wednesday, January 13, 2021 9:29 PM
To: Florence Sevold <fsevold@bluestoneenviro.com>; Laura Paolella <lpaolella@bluestoneenviro.com>; Molly Horning <mhorning@bluestoneenviro.com>; Rachel Urban <rurban@bluestoneenviro.com>
Cc: Mike Badeau <mbadeau@bluestoneenviro.com>
Subject: RE: ISSUES! Eurofins TestAmerica Sample Login Confirmation files from 280-144550 New York Ordinance Works (NYOW)

[EXTERNAL]

I will ask the guys in the morning and let you know.

Patrick J McEntee
Client Service Manager

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins Environment Testing America

Client Information	Sampler	Lab PM	Carrier Tracking No(s)	COC No
Client Contact: Lori Paolella	Joe Maule	McEntee, Patrick J		
Company: Bluestone Environmental Group Inc	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1of1
Address: 301 Lindenwood Drive	PWSID:	Due Date Requested:		Job #: W912WJ.19D0001.19F0056.0400.L
City: Malvern		TAT Requested (days): 15 business day		
State, Zip: PA, 19355		Compliance Project: Δ Yes Δ No		
Phone: (610) 647-9500 x.1028		PO #:		
Email: lpaolella@bluestoneenviro.com		WO #:		
Project Name: NYOW AOC5		Project #: W912WJ.19D0001.19F0056.0400.L		
Site: Baldwinsville, New York		SSOW#:		

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422 Grain Size (ETA Seattle)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
NYOW-05-SL003-A	1/12/21	1000	G	S	N	N	1	1	
NYOW-05-SL003-B	1/12/21	1005	G	S	N	N	1	1	
NYOW-05-SL003-C	1/12/21	1010	G	S	N	N	1	1	

280-144558 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 1/12/21 1800	Company: Bluestone	Received by:	Date/Time: 1/13/21 0930	Company: EDD EN
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.: 1448601, 1448635, 1448638
1448606, 1448597, 1448633

Cooler Temperature(s) °C and Other Remarks: 3.9, 5.4, 4.1, 4.4, 5.7, 1.0
IR#9 CF+0.2

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225 — eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW ACO5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL List	8270D SIM PAHs	9060A TOC	9045 Grain Size (ETA Seattle) SG 1/13/21	9081 CEC (ETA Corpus)	8082A PCBs	Moisture (%)			Total Number of containers
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N			
NYOW-05-WL001-A	1/13/21	0930	G	W	Y	Y	-	3	-	9	6	6	-		-	6	-			30
NYOW-05-SL011-A	1/13/21	0845	G	S	N	N	1	-	-		1	1	-		-	1	✓			4
NYOW-05-PH011-B	1/13/21	0850	G	S	N	Y	3	-	-		3	3	-		-		✓			9
NYOW-05-PH011-C	1/13/21	0855	G	S	N	N	1	-	-		1	1	-		-		✓			3
NYOW-05-SL012-A	1/13/21	0940	G	S	N	N	1	-	-		1	1	1		1	1	✓			6
NYOW-05-PH012-B	1/13/21	0945	G	S	N	N	1	-	-		1	1	1		1	-	✓			5
NYOW-05-PH012-C	1/13/21	0950	G	S	N	N	1	-	-		1	1	1		1	-	✓			5
NYOW-05-SL013-A	1/13/21	1320	G	S	N	N	1	-	-		1	1	-		-	1	✓			4
NYOW-05-PH013-B	1/13/21	1324	G	S	N	N	1	-	-		1	1	-		-		✓			3
NYOW-05-PH013-C	1/13/21	1327	G	S	N	N	1	-	-		1	1	-		-		✓			3
PH-DUP-001_210113	1/13/21	0000	G	S	N	N	1	-	-		1	1	-		-		✓			3

280-144607 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/13/21 1600	Bluestone		1/13/21 1600	ES-SYR
2		1-13-21, 1900	FedEx	FEDEX	1-13-21, 1905	FEDEX
3		Date/Time:	Company		1/14/21 0915	ETADEN

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.: 1402387 1402389, 1402390 1402393, 1402388

Cooler Temperature(s) °C and Other Remarks: 2.8, 0.2, 0.1, 2.2, 0.2 IR#9CF+02

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse eurofins Environment Testing America

#225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW ACO5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) 3/9 1/13/21	9081 CEC (ETA Corpus)	8082A PCBs	Moisture (≤1°)			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-SL014-A	1/13/21	1400	G	S	N	N	1	—	—	—	1	1	—		—	1	✓	—			4	
NYOW-05-PH014-B	1/13/21	1405	G	S	N	N	1	—	—	—	1	1	—		—		✓	—			3	
NYOW-05-PH014-C	1/13/21	1410	G	S	N	N	1	—	—	—	1	1	—		—		✓	—			3	
NYOW-05-SL015-A	1/13/21	1610	G	S	N	N	1	—	—	—	1	1	—		—	1	✓	—			4	
NYOW-05-PH015-B	1/13/21	1612	G	S	N	N	1	—	—	—	1	1	—		—		✓	—			3	
NYOW-05-PH015-C	1/13/21	1620	G	S	N	N	1	—	—	—	1	1	—		—		✓	—			3	
~~WL-DUP-001_210113~~	~~1/13/21~~	0000	G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—			10	MS sample 1/13/21
~~NYOW-05-WL004-A~~	~~1/13/21~~		G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—			10	MS sample 1/13/21
EB-01_210113	1/13/21	1515	G	W	N	N	—	1	—	2	2	—			—	2	—	—			7	
EB-02_210113	1/13/21	1530	G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—			10	
TB-01_210113	1/13/21	0730	G	W	N	N	—	—	—	2	—	—	—		—	—	—	—			2	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/13/21 1600	Bluestone		1/13/21 1600	ES-SYR
2	Relinquished by	1-13-21, 1900	Syr	FEDEX	1-13-21, 1905	FEDEX
3	Relinquished by	Date/Time	Company	Received by	1/14/21 0915	ETADEN

Custody Seals Intact: ✓ Yes Δ No

Custody Seal No.: 1402387, 1402389, 1402390
1402392, 1402388

Cooler Temperature(s) °C and Other Remarks: 2.8, 0.2, 0.1, 2.8, 0.2 IR#9CF#0.2

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225 eurofins Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422 Grain Size (ETA Seattle)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
NYOW-05-SL012-A	1/13/21	0940	G	S	N	N	1	1	
NYOW-05-PH012-B	1/13/21	0945	G	S	N	N	1	1	
NYOW-05-PH012-C	1/13/21	0950	G	S	N	N	1	1	

1/13/21

280-144621 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	1/13/21 1600	Bluestone	[signature]	1/13/21 1600	ES-Syr
[signature]	1-13-21, 1905	Syr	FEDEX	1-13-21, 1905	Syr
			[signature]	1/14/21 0915	ETADEN

Custody Seals Intact: ☑ Yes Δ No | Custody Seal No.: 1402387, 1402389, 1402390, 1402392, 1402388

Cooler Temperature(s) °C and Other Remarks: 2.8, 0.2, 0.1, 2.2, 0.2 RH9CF7 0.2

Ver: 01/16/2019

From:	Florence Sevold
To:	McEntee, Patrick; Rachel Urban; Laura Paolella; Molly Horning
Cc:	Kirar, Dylan A.; Mike Badeau
Subject:	RE: ISSUE ! NCM 280-544064, Receiving - Containers, Broken, New York Ordinance Works (NYOW), 280-144621-1
Date:	Monday, January 18, 2021 3:09:34 PM

Dear Pat,

Thank you for taking the time to talk to me this afternoon. Once the analyses for the other methods (e.g., metals, SVOCs, PAHs) indicated for sample NYOW-05-PH012-B are complete, if there is sufficient appropriate sample volume left such that the grain size analysis can be done, please do so.
If you have any questions, or I mischaracterized our conversation, please let me know.
Regards,
Florence

Florence Sevold
Technical Director
Bluestone Environmental Group, Inc.
An 8(a), EDWOSB Company
www.bluestoneenviro.com
301 Lindenwood Drive | Suite 102 | Malvern, PA 19355
Office: 610.647.9500 x.1019 | Direct: 484.341.7380 | Cell: 215 .498. 9232

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Thank you.

-----Original Message-----
From: McEntee, Patrick <Patrick.McEntee@Eurofinset.com>
Sent: Monday, January 18, 2021 1:19 PM
To: Florence Sevold <fsevold@bluestoneenviro.com>; Rachel Urban <rurban@bluestoneenviro.com>; Laura Paolella <lpaolella@bluestoneenviro.com>; Molly Horning <mhorning@bluestoneenviro.com>
Cc: Kirar, Dylan A. <Dylan.Kirar@Eurofinset.com>
Subject: ISSUE ! NCM 280-544064, Receiving - Containers, Broken, New York Ordinance Works (NYOW), 280-144621-1
Importance: High

[EXTERNAL]

Hello

I received notification on Saturday that this container (that Denver shipped) was received at Seattle broken and not salvageable.

The error has been addressed with the shipping department manager.

Please advise on how to proceed.

Thanks,
Pat

Patrick J McEntee
Client Service Manager

Phone: 303-736-0107

E-mail: Patrick.McEntee@Eurofinset.com

Project(s): New York Ordinance Works (NYOW)
Job(s)/Client(s): 280-144621-1 Bluestone Environmental Group Inc
Lab Section(s): Geotechnical
Method(s): D422
NCM Type: Anomaly - Receiving - Containers, Broken
Affected Item(s): Sample: 280-144621-2 NYOW-05-PH012-B

Narrative: One or more containers for the following sample(s) was received broken or leaking: Sample #2 appears to have broken during shipping to Seattle for analysis. The sample was completely submerged in water and appears to have been compromised.

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information
Client Contact: Lori Paolella
Company: Bluestone Environmental Group Inc
Address: 301 Lindenwood Drive
City: Malvern
State, Zip: PA, 19355
Phone: (610) 647-9500 x.1028
Email: lpaolella@bluestoneenviro com
Project Name: NYOW ACO5
Site: Baldwinsville, New York

Sampler: Joe Maule
Phone: (610) 647-9500 x.1028
PWSID:
Due Date Requested:
TAT Requested (days): 15 business day
Compliance Project: Δ Yes Δ No
PO #:
WO #:
Project #: W912WJ.19D0001.19F0056.0400 L
SSOW#:

Lab PM: McEntee, Patrick J
E-Mail: Patrick.McEntee@Eurofinset.com
Carrier Tracking No(s): Syracuse #225
State of Origin: NY

COC No:
Page: 1 of 2
Job #: W912WJ.19D0001.19F0056.0400.L

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) -- Sq 1/14/21	9081 CEC (ETA Corpus)	8082A PCBs	Moisture (%)			Total Number of containers
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N			
NYOW-05-WL004-A	1/14/21	0815	G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—	—	10
WL-DUP-001_210114	1/14/21	0000	G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—	—	10
NYOW-05-WL005-A	1/14/21	0930	G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—	—	10
NYOW-05-WL012-A	1/14/21	1155	G	W	Y	N	—	1	—	—	2	2	—		—	—	—	—	—	5
WL-DUP-002_210114	1/14/21	0000	G	W	Y	N	—	1	—	—	2	2	—		—	—	—	—	—	5
NYOW-05-SL017-1-A	1/14/21	0955	G	S	N	N	1	—	—	—	1	1	—		—	—	✓	—	—	3
SL-DUP-001_210114	1/14/21	0000	G	S	N	N	1	—	—	—	1	1	—		—	—	✓	—	—	3
NYOW-05-PH017-1-B	1/14/21	1005	G	S	N	N	1	—	—	—	1	1	—		—	—	✓	—	—	3
PH-DUP-001_210114	1/14/21	0000	G	S	N	N	1	—	—	—	1	1	—		—	—	✓	—	—	3
NYOW-05-PH017-1-C	1/14/21	1010	G	S	N	N	1	—	—	—	1	1	—		—	—	✓	—	—	3
NYOW-05-SL016-A	1/14/21	1315	G	S	N	N	1	—	—	—	1	1	1		1	—	✓	—	—	5

Special Instructions/Note:

280-144651 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	1/14/21 1600	Bluestone	Received by:	1/14/21 1600	FS-SYR
Relinquished by:	1-14-21, 1900	Syr	Received by: FEDEX	1-14-21, 1905	FEDEX
Relinquished by:			Received by:	1/15/21 1000	EVADEN

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 1402398, 1402401, 1402400, 1402399, 1402403

Cooler Temperature(s) °C and Other Remarks: .9, 0.4, 1.5, 0.7, 0.6 IR Gun CF +0.1

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW ACO5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah)	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Scottsville) SG 1/14/21	9081 CEC (ETA Corpus)	8082A PCBs	Moisture (%)			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N				
NYOW-05-PH016-B	1/14/21	1320	G	S	N	N	1	—	—	—	1	1	1		1	—	✓	—		5	
NYOW-05-PH016-C	1/14/21	1325	G	S	N	N	1	—	—	—	1	1	1		1	—	✓	—		5	
TB-01_210114	1/14/21	0730	G	W	N	N	—	—	—	2	—	—	—		—	—	—	—		2	
EB-01_210114	1/14/21	1500	G	W	N	N	—	1	—	—	2	2	—		—	—	—	—		5	
EB-02_210114	1/14/21	1515	G	W	Y	N	—	1	—	3	2	2	—		—	2	—	—		10	

1/14/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time: 1/14/21 1600	Company: Bluestone	Received by:	Date/Time: 1/14/21 1600	Company: ES-SYR
Relinquished by: RELD 1/14	Date/Time: 1-4-21, 1900	Company: SYR	Received by: FEDEX	Date/Time: 1-14-21, 1905	Company: FEDEX
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 1/15/21 1000	Company: EDADEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler	Lab PM	Carrier Tracking No(s)	COC No
Client Contact: Lori Paolella	Joe Maule	McEntee, Patrick J	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	PWSID:	Job #: W912WJ 19D0001.19F0056.0400.L
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State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x 1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

280-144654 Chain of Custody

Preservation Codes:

A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422 Grain Size (ETA Seattle)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
NYOW-05-SL016-A	1/14/21	1315	G	S	N	N	1	1	
NYOW-05-PH016-B	1/14/21	1320	G	S	N	N	1	1	
NYOW-05-PH016-C	1/14/21	1325	G	S	N	N	1	1	

1/14/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/14/21 1600	Bluestone		1/14/21 1600	ES-SYR
2	Relinquished by	1-14-21, 1900	Syr	FEDEX	1-14-21, 1905	Syr
3	Relinquished by	Date/Time	Company	Received by	1/15/21 1000	ETADEN

Custody Seals Intact: Δ Yes Δ No

Custody Seal No: 140398, 140401, 140400
140399, 140403

Cooler Temperature(s) °C and Other Remarks: .9, 0.4, 1.5, 0.7, 0.6 IR#9CF40

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: Page 1 of 1
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Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW ACO5	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C + 6020A + 7471B Metals (discrete soil)	6010C + 6020A + 7470A Metals (water)	8260B VOCs (discrete soil Terra Core)	8260B VOCs (water)	8270D SVOCs (ETA Savannah) TCL list	8270D SIM PAHs	9060A TOC	D422 Grain Size (ETA Seattle) SG 1/15/21	9081 CEC (ETA Corpus)	8082A PCBs	Moisture (%)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	J/F	A	N	N	N	N	N	N	N		
NYOW-05-WL016-A	1/15/21	1244	G	W	Y	N	—	1	—		2	2	—					5	
NYOW-05-WL017-1-A	1/15/21	1202	G	W	Y	N	—	1	—		2	2	—					5	
NYOW-05-WL019-A	1/15/21	0925	G	W	Y	N	—	1	—		2	2	—					5	
EB-01_210115	1/15/21	1945	G	W	Y	N	—	1	—		2	2	—					5	
RL-1-1-21-2																			

280-144706 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Joseph Maule	Date/Time: 1/15/21 16:00	Company: Bluestone	Received by:	Date/Time: 1/15/21 1600	Company: ES-SYR
Relinquished by:	Date/Time: 1-15-21, 1900	Company:	Received by:	Date/Time: 1-15-21 1905	Company: FedEx
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 1/16/2021 09:50	Company: Eurofins

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 1402408

Cooler Temperature(s) °C and Other Remarks: 0.2 IR 9 CF 10:2

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

280-144913 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP) Sav	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Containers	Actions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH035-B	1/25/21	1030	G	S	N	Y	3	3	—	✓	9	
NYOW-04-PH034-B	1/25/21	1045	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH033-B	1/25/21	1055	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH030-B	1/25/21	1105	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH029-B	1/25/21	1115	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH028-B	1/25/21	1125	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH025-B	1/25/21	1145	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH024-B	1/25/21	1200	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH023-B	1/25/21	1245	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH022-B	1/25/21	1300	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH019-B	1/25/21	1315	G	S	N	N	1	1	—	✓	2	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	1/25/21 1610	Bluestone	[signature]	1/25/21 1610	ES-SM
Rendglish	1-25-21, 1900	Syn	FedEx	1-25-21, 1905	FedEx
Fed Ex			[signature]	1/26/21 0445	ETADEN

Custody Seals Intact: ☑ Yes Δ No

Custody Seal No.: 1402427, 1402414, 1402422

Cooler Temperature(s) °C and Other Remarks: 2.7, 0.4, 1.9 1.29 CF +0.8

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP) SOV	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH018-B	1/25/21	1325	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH017-B	1/25/21	1335	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH014-B	1/25/21	1345	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH013-B	1/25/21	1400	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH012-B	1/25/21	1410	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH009-B	1/25/21	1420	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH008-B	1/25/21	1430	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH007-B	1/25/21	1445	G	S	N	N	1	1	–	✓	2	
EB-01_210125	1/25/21	1530	G	W	N	N	2	–	2	—	4	
							1/25/21					

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	1/25/21 1610	Bluestone	[signature]	1/25/21 1610	ES-SYN
[signature]	1-25-21, 1900	Syn	FedEx	1-25-21, 1905	FedEx
FedEx			[signature]	1/26/21 0945	EDADEN

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.: 1402427, 1402414, 1402422

Cooler Temperature(s) °C and Other Remarks: 2.7, 0.4, 1.9 1.9 CF+0.2

Ver: 01/16/2019

From: Molly Horning
To: Patrick.McEntee@Eurofinset.com
Cc: Mike Badeau; Florence Sevold; Rachel Urban; Laura Paolella
Subject: RE: NYOW AOC 4 COCs 01/25/21
Date: Monday, January 25, 2021 4:46:02 PM

Hi Patrick,

One correction for today's COC: EB-01_210125 is listed with 8330A Explosives and 8330B Explosives, but should be 8270D SVOCs and 8330B Explosives.

Thanks,

Molly Horning

From: Skylar Georgius <sgeorgius@bluestoneenviro.com>
Sent: Monday, January 25, 2021 3:55 PM
To: Patrick.McEntee@Eurofinset.com
Cc: Joe Maule <jmaule@bluestoneenviro.com>; Mike Badeau <mbadeau@bluestoneenviro.com>; Christen Sardano <csardano@bluestoneenviro.com>; Florence Sevold <fsevold@bluestoneenviro.com>; Molly Horning <mhorning@bluestoneenviro.com>; Rachel Urban <rurban@bluestoneenviro.com>; Laura Paolella <lpaolella@bluestoneenviro.com>
Subject: NYOW AOC 4 COCs 01/25/21

Attached is the chain of custody for today's soil sampling at AOC 4.

Thanks,
Skylar

On Jan 13, 2021 4:36 PM, Skylar Georgius <sgeorgius@bluestoneenviro.com> wrote:

> Hello,
> Attached are the chains of custody from today's sampling event.
>
> Skylar
>
> On Jan 11, 2021 3:51 PM, Skylar Georgius <sgeorgius@bluestoneenviro.com> wrote:
> Attached to the chains of custody from today's sampling event.
>
> On Jan 7, 2021 3:51 PM, Skylar Georgius <sgeorgius@bluestoneenviro.com> wrote:
> Hi Patrick,
>
> Lori let us know that you'd like to see the chains of custody before they get shipped every day.
> Attached are the chains of custody we just turned over to the lab courier.
>
> Thanks,

Skylar Georgius
(301)366-9519

From:	Molly Horning
To:	Patrick McEntee; Florence Sevold; Laura Paolella; Rachel Urban
Subject:	RE: Eurofins TestAmerica Sample Login Confirmation files from 280-144913 New York Ordinance Works (NYOW),AOC4
Date:	Wednesday, January 27, 2021 3:26:49 PM

Hi Patrick,

Looking back at the COC it looks like the 9 for total number of containers was a typo and should have been 6 so that is fine.

Thanks!

Molly Horning

From: Patrick McEntee <Patrick.McEntee@Eurofinset.com>
Sent: Wednesday, January 27, 2021 2:50 PM
To: Florence Sevold <fsevold@bluestoneenviro.com>; Laura Paolella <lpaolella@bluestoneenviro.com>; Molly Horning <mhorning@bluestoneenviro.com>; Rachel Urban <rurban@bluestoneenviro.com>
Subject: Eurofins TestAmerica Sample Login Confirmation files from 280-144913 New York Ordinance Works (NYOW),AOC4

[EXTERNAL]

Hello,

Attached, please find the Sample Confirmation files for job 280-144913; New York Ordinance Works (NYOW),AOC4

Receipt Exceptions
NYOW-04-PH035-B; Total number of containers says 9 on CoC, only 6 received.

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

Thank you.

Patrick J McEntee
Client Services Manager

Eurofins TestAmerica, Denver
Phone: 303-736-0107

E-mail: Patrick.McEntee@Eurofinset.com
www.eurofinsus.com/env

Reference: [280-695131]
Attachments: 2

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s): #225	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 3
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			Preservation Codes:
City: Malvern	TAT Requested (days): 15 business day			A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify)
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			Other:
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

280-144952 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Analysis: 8330A Explosives (Picric Acid) (discrete soil)	Analysis: 8270D SVOCs (DNCB and 2,4-DNP)	Analysis: 8330B Explosives (Picric Acid) (aqueous)	Analysis: Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH039-B	1/26/21	0810	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH040-B	1/26/21	0830	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH041-B	1/26/21	0845	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH044-B	1/26/21	0855	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH045-B	1/26/21	0905	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH046-B	1/26/21	0915	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH047-B	1/26/21	0925	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH048-B	1/26/21	0935	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH051-B	1/26/21	0945	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH052-B	1/26/21	1005	G	S	N	Y	3	3	–	✓	6	
NYOW-04-PH053-B	1/26/21	1030	G	S	N	N	1	1	–	✓	2	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/26/21 1545	Bluestone		1/26/21 1545	ES-SYR
2	Fedex	1.26.21, 1900		FEDEX	1.26.21, 1905	FEDEX
3		1/27/2021 0935			1/27/2021 0935	ETA Den

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 140242 8/140242 9/1404167

Cooler Temperature(s) °C and Other Remarks: 0.4/3.8/0.7 ID 9 CF +0.2

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 3
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
PH-DUP-001_210126	1/26/21	0000	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH056-B	1/26/21	1045	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH057-B	1/26/21	1055	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH058-B	1/26/21	1105	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH061-B	1/26/21	1130	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH062-B	1/26/21	1140	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH063-B	1/26/21	1150	G	S	N	N	1	1	-	✓	2	
PH-DUP-002_210126	1/26/21	0000	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH066-B	1/26/21	1205	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH067-B	1/26/21	1215	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH068-B	1/26/21	1225	G	S	N	N	1	1	-	✓	2	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 1/26/21 1545	Company: Bluestone	Received by:	Date/Time: 1/26/21 1545	Company: ES SYR
Relinquished by: Fed Ex	Date/Time: 1-26-21, 1900	Company:	Received by: FEDEX	Date/Time: 1-26-21, 1905	Company: FedEx
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 1/27/21 0935	Company: EON ERA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse | eurofins | Environment Testing America

#225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 3 of 3
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH071-B	1/26/21	1235	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH072-B	1/26/21	1245	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH073-B	1/26/21	1305	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH076-B	1/26/21	1320	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH077-B	1/26/21	1335	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH078-B	1/26/21	1415	G	S	N	N	1	1	—	✓	2	
~~EB-01-2126~~ SG 1/26/21 EB-01-210126	1/26/21	1515	G	W	N	N	—	2	2	—	4	

1/26/21

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month): ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:
Empty Kit Relinquished by:	Date: Time: Method of Shipment:

Relinquished by:	Date/Time: 1/26/21 1545	Company: Bluestone	Received by:	Date/Time: 1/26/21 1545	Company: ES-SYR
Relinquished by: Fed Ex	Date/Time: 1-26-21, 1900	Company:	Received by: FEDEX	Date/Time: 1-26-21, 1905	Company: FEDEX
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 1/27/2021 0935	Company: EHDRM

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information

Client Contact:	Lori Paolella
Company:	Bluestone Environmental Group Inc
Address:	301 Lindenwood Drive
City:	Malvern
State, Zip:	PA, 19355
Phone:	(610) 647-9500 x.1028
Email:	lpaolella@bluestoneenviro.com
Project Name:	NYOW AOC4
Site:	Baldwinsville, New York
Sampler:	Joe Maule
Phone:	(610) 647-9500 x.1028
PWSID:	
Due Date Requested:	
TAT Requested (days):	15 business day
Compliance Project:	Δ Yes Δ No
PO #:	
WO #:	
Project #:	W912WJ.19D0001.19F0056.0400.L
SSOW#:	
Lab PM:	McEntee, Patrick J
E-Mail:	Patrick.McEntee@Eurofinset.com
Carrier Tracking No(s):	Syracuse
State of Origin:	NY #225
COC No:	
Page:	1 of 2
Job #:	W912WJ.19D0001.19F0056.0400.L

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers
			Preservation Code:				N	N	N	N	
NYOW-04-PH065-B	1/27/21	0930	G	S	N	N	1	1	-	✓	2
NYOW-04-PH064-B	1/27/21	0940	G	S	N	N	1	1	-	✓	2
NYOW-04-PH060-B	1/27/21	0950	G	S	N	N	1	1	-	✓	2
NYOW-04-PH059-B	1/27/21	1000	G	S	N	N	1	1	-	✓	2
NYOW-04-PH043-B	1/27/21	1015	G	S	N	N	1	1	-	✓	2
PH-DUP-001_210127	1/27/21	0000	G	S	N	N	1	1	-	✓	2
NYOW-04-PH042-B	1/27/21	1025	G	S	N	N	1	1	-	✓	2
NYOW-04-PH016-B	1/27/21	1110	G	S	N	N	1	1	-	✓	2
PH-DUP-002_210127	1/27/21	0000	G	S	N	N	1	1	-	✓	2
NYOW-04-PH015-B	1/27/21	1055	G	S	N	Y	3	3	-	✓	6
NYOW-04-PH020-B	1/27/21	1130	G	S	N	N	1	1	-	✓	2

Special Instructions/Note:

280-144996 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	1/27/21, 15:12	Bluestone	REnglish	1.27.20, 15:12	Syr
REnglish	1-27-21, 1900	Syr	FedEx	1.27.20, 1905	FedEx
	27		[signature]	01/28/2021 0925	ETA-Den

Custody Seals Intact: ☑ Yes Δ No | Custody Seal No.: 14662296, 14662297

Cooler Temperature(s) °C and Other Remarks: 1.9°C, 2.2°C IR#9 +0.2 CF

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information
Client Contact: Lori Paolella
Company: Bluestone Environmental Group Inc
Address: 301 Lindenwood Drive
City: Malvern
State, Zip: PA, 19355
Phone: (610) 647-9500 x 1028
Email: lpaolella@bluestoneenviro.com
Project Name: NYOW AOC4
Site: Baldwinsville, New York

Sampler: Joe Maule
Phone: (610) 647-9500 x 1028
PWSID:
Due Date Requested:
TAT Requested (days): 15 business day
Compliance Project: Δ Yes Δ No
PO #:
WO #:
Project #: W912WJ 19D0001 19F0056.0400.L
SSOW#:

Lab PM: McEntee, Patrick J
E-Mail: Patrick.McEntee@Eurofinset.com
Carrier Tracking No(s):
Syracuse
State of Origin: NY #225

COC No:
Page: 2 of 2
Job #: W912WJ.19D0001.19F0056.0400.L

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH021-B	1/27/21	1150	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH026-B	1/27/21	1215	G	S	N	N	1	1	-	✓	2	
PH-DUP-003_210127	1/27/21	0000	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH027-B	1/27/21	1230	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH031-B	1/27/21	1300	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH032-B	1/27/21	1310	G	S	N	N	1	1	-	✓	2	
NYOW-04-SW083-A	1/27/21	1400	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH083-B	1/27/21	1410	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH083-C	1/27/21	1420	G	S	N	N	1	1	-	✓	2	
EB-01_210127	1/27/21	1515	G	S	N	N	-	2	2		4	

SG 1/27/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

	Date/Time	Company	Received by	Date/Time	Company
Relinquished by:	1/27/21 15:12	Bluestone		1-27-21, 15:12	
Relinquished by:	1-27-21, 19:00		FEDEX	1-27-21, 1905	FEDEX
Relinquished by:	Date/Time:	Company	Received by	01/28/2021 0925	EA-Den

Custody Seals Intact: ✓ Yes Δ No
Custody Seal No.: 1416022296, 1416022297
Cooler Temperature(s) °C and Other Remarks: 1.9°C, 2.2°C IR#9 +0.2CF

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225

eurofins Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-SL081-A	1/28/21	0820	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH081-B	1/28/21	0830	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH081-C	1/28/21	0840	G	S	N	N	1	1	—	✓	2	
SL-DUP-001_210128	1/28/21	0000	G	S	N	N	1	1	—	✓	2	
PH-DUP-001_210128	1/28/21	0000	G	S	N	N	1	1	—	✓	2	
NYOW-04-SL079-A	1/28/21	1130	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH079-B	1/28/21	1140	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH079-C	1/28/21	1150	G	S	N	N	1	1	—	✓	2	
NYOW-04-SL002-A	1/28/21	1400	G	S	N	N	1	1	—	✓	2	
SL-DUP-002_210128	1/28/21	0000	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH002-B	1/28/21	1410	G	S	N	N	1	1	—	✓	2	

280-145030 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
[signature]	1/28/21 1515	Bluestone	[signature]	1/28/21 1515	ES-Syr
R. Eugbin	1-28-21, 1900	Syr	FedEx	1-25-21, 1905	Syr FedEx
FedEx			[signature]	01/29/2021 0950	ETA DEW

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.: 1402440

Cooler Temperature(s) °C and Other Remarks: 1.1 CF+0.2 IR9

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse eurofins Environment Testing America

#225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x 1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH002-C	1/28/21	1420	G	S	N	N	1	1	-	✓	2	
EB-01_210128	1/28/21	1500	G	W	N	N	-	2	2		4	

1/28/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		1/28/21 1515	Bluestone		1/28/21 1515	ES-SYR
2	Relinquished by: FedEx	Date/Time: 1-28-21, 1900	Company: Syr	Received by: FedEx	Date/Time: 1-28-21, 1905	Company: Syr-FEDEX
3	Relinquished by: FedEx	Date/Time:	Company:	Received by:	Date/Time: 01/29/20 0950	Company: ETHDEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225

eurofins | Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

280-145058 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-SL004-A	1/29/21	0900	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH004-B	1/29/21	0910	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH004-C	1/29/21	0920	G	S	N	N	1	1	-	✓	2	
NYOW-04-SL005-A	1/29/21	1015	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH005-B	1/29/21	1025	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH005-C	1/29/21	1035	G	S	N	N	1	1	-	✓	2	
~~EB-01-210129~~	~~1/29/21~~	~~1300~~	G	S	N	N	1	1	-	✓	2	SG 1/29/21
EB-01-210129	1/29/21	1300	G	W	N	N	-	2	2	-	4	

1/29/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company	Received by	Date/Time	Company
Relinquished by:	1/29/21, 13:11	Bluestone		1-29-21, 13:11	
Relinquished by:	1-29-21, 1900		FedEx	1-29-21, 1905	FedEx
Relinquished by:				1/30/21 0930	ETA Den

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 1401449

Cooler Temperature(s) °C and Other Remarks: 1.1 CF+0.2 IR9

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: Page 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	containers
			Preservation Code:				N	N	N	N	
NYOW-04-WL083-A	2/1/21	0900	G	W	N	N	-	2	2		4
NYOW-04-WL081-A	2/1/21	0930	G	W	N	N	-	2	2		4
WL-DUP-001_210201	2/1/21	0000	G	W	N	N	-	2	2		4
NYOW-04-WL079-A	2/1/21	1030	G	W	N	N	-	2	2		4
NYOW-04-WL002-A	2/1/21	1115	G	W	N	N	-	2	2		4
NYOW-04-WL004-A	2/1/21	1205	G	W	N	N	-	2	2		4
WL-DUP-002_210201	2/1/21	0000	G	W	N	N	-	2	2		4
NYOW-04-WL005-A	2/1/21	1315	G	W	N	N	-	2	2		4
EB-01_210201	2/1/21	1400	G	W	N	N	-	2	2		4
							2/1/21				

280-145110 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	2/1/21 1450	Bluestone	Received by:	2/1/21 1450	EC-SYR
Relinquished by:	2-1-21, 1900		Received by: FEDEX	2-2-21,	FEDEX
Relinquished by: FEDEX	Date/Time:	Company	Received by:	02/02/2021, 09.40	ETADEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 3.4, 0.6, 0.8, CF: +0.2, IR: 9

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse #225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, other (specify)

280-145163 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-SL036-A	2/2/21	0840	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH036-B	2/2/21	0850	G	S	N	N	1	1	–	✓	2	
PH-DUP-001_210202	2/2/21	0000	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH036-C	2/2/21	0900	G	S	N	N	1	1	–	✓	2	
NYOW-04-SL080-A	2/2/21	1220	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH080-B	2/2/21	1225	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH080-C	2/2/21	1230	G	S	N	N	1	1	–	✓	2	
NYOW-04-SL082-A	2/2/21	1345	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH082-B	2/2/21	1350	G	S	N	N	1	1	–	✓	2	
NYOW-04-PH082-C	2/2/21	1355	G	S	N	N	1	1	–	✓	2	
EB-01_210202	2/2/21	1430	G	W	N	N	–	2	2		4	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time: 2/2/21 1435	Company: Bluestone	Received by:	Date/Time: 2/2/21 1455	Company: ES-SYR
Relinquished by:	Date/Time: 2-2-21, 1900	Company: Syr	Received by: FedEx	Date/Time: 2-2-21, 1905	Company: FedEx
Relinquished by: FedEx	Date/Time:	Company:	Received by:	Date/Time: 2/2/2021 0910	Company: ETADem

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 14024604

Cooler Temperature(s) °C and Other Remarks: 1.1 (F+0.2 IR-9

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse — eurofins | Environment Testing America

#225

Client Information	Sampler	Lab PM	Carrier Tracking No(s)	COC No
Client Contact: Lori Paolella	Joe Maule	McEntee, Patrick J		
Company: Bluestone Environmental Group Inc	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 2
Address: 301 Lindenwood Drive	PWSID:	Due Date Requested:		Job #: W912WJ.19D0001.19F0056.0400.L
City: Malvern		TAT Requested (days): 15 business day		
State, Zip: PA, 19355		Compliance Project: Δ Yes Δ No		
Phone: (610) 647-9500 x.1028		PO #:		
Email: lpaolella@bluestoneenviro.com		WO #:		
Project Name: NYOW AOC4		Project #: W912WJ.19D0001.19F0056.0400.L		
Site: Baldwinsville, New York		SSOW#:		

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers
			Preservation Code:				N	N	N	N	
NYOW-04-SL084-A	2/3/21	0810	G	S	N	N	1	1	-	✓	2
NYOW-04-PH084-B	2/3/21	0820	G	S	N	Y	3	3	-	✓	6
NYOW-04-PH084-C	2/3/21	0830	G	S	N	N	1	1	-	✓	2
NYOW-04-SL085-A	2/3/21	0930	G	S	N	N	1	1	-	✓	2
NYOW-04-PH085-B	2/3/21	0940	G	S	N	N	1	1	-	✓	2
PH-DUP-001_210203	2/3/21	0000	G	S	N	N	1	1	-	✓	2
NYOW-04-PH085-C	2/3/21	0950	G	S	N	Y	3	3	-	✓	6
NYOW-04-SL037-A	2/3/21	1040	G	S	N	N	1	1	-	✓	2
NYOW-04-PH037-B	2/3/21	1050	G	S	N	N	1	1	-	✓	2
NYOW-04-PH037-C	2/3/21	1100	G	S	N	N	1	1	-	✓	2
NYOW-04-SL038-A	2/3/21	1145	G	S	N	N	1	1	-	✓	2

Preser
A - HC
B - Na
C - Zr
D - Ni
E - N
F - M
G - A
H - A
I - Ic
J - D
K - E
L - E
Othe

280-145209 Chain of Custody

3
decahydrate
:
pecify)

ns/Note:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by:		Date/Time: 2/3/21 1510	Company: Bluestone	Received by:		Date/Time: 2-3-21, 15:10	Company:
Relinquished by:		Date/Time: 2-3-21, 1900	Company:	Received by: FedEx		Date/Time: 2-3-21, 1905	Company: FEDEX
Relinquished by: FEDEX		Date/Time:	Company: FEDEX	Received by:		Date/Time: 2/4/2021 0920	Company: FEDEX

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 1402468 / 1402469

Cooler Temperature(s) °C and Other Remarks: 1.8 / 0.9 CF 0.2 IR 9

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

eurofins | Environment Testing America

Syracuse

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s): #225	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 2
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH038-B	2/3/21	1155	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH038-C	2/3/21	1205	G	S	N	N	1	1	-	✓	2	
NYOW-04-SL006-A	2/3/21	1250	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH006-B	2/3/21	1300	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH006-C	2/3/21	1310	G	S	N	N	1	1	-	✓	2	
PH-DUP-002_210203	2/3/21	0000	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH075	2/3/21	1355	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH074	2/3/21	1420	G	S	N	N	1	1	-	✓	2	
PH-DUP-003_210203	2/3/21	0000	G	S	N	N	1	1	-	✓	2	
EB-01_210203	2/2/21	1445	G	W	N	N	-	2	2		4	

SG 2/3/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		2/3/21 1510	Bluestone		2-3-21, 15:10	
2		2-3-21, 1900			2-3-21, 1905	
3	FEDEX		FEDEX		2/4/2021 0920	FEDEX

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 1402461 / 1402469

Cooler Temperature(s) °C and Other Remarks: 1.8/0.9 IR9 CF 0.2

Ver: 01/16/2019

From:	Kirar, Dylan A.
To:	Molly Horning; Wing, Leia V.; Florence Sevold; Laura Paolella; Rachel Urban
Cc:	McEntee, Patrick
Subject:	RE: Please Read: Eurofins TestAmerica Sample Login Confirmation files from 280-145209 New York Ordinance Works (NYOW),AOC4
Date:	Monday, February 8, 2021 12:06:28 PM
Attachments:	SampleLoginAck_280-145209-1 [Std_Tal_Login_Ack].pdf

[EXTERNAL]

Hi Molly,

Please see the revised confirmation, attached.

Best,

Dylan Kirar
Project Management Assistant

Eurofins TestAmerica
4955 Yarrow St
Arvada, CO 80002 USA

Phone: 303-736-0103
Dylan.Kirar@eurofinset.com

From: Molly Horning <mhorning@bluestoneenviro.com>
Sent: Monday, February 8, 2021 8:41 AM
To: Wing, Leia V. <Leia.Wing@Eurofinset.com>; Florence Sevold <fsevold@bluestoneenviro.com>; Laura Paolella <lpaolella@bluestoneenviro.com>; Rachel Urban <rurban@bluestoneenviro.com>
Cc: McEntee, Patrick <Patrick.McEntee@Eurofinset.com>; Kirar, Dylan A. <Dylan.Kirar@Eurofinset.com>
Subject: RE: Please Read: Eurofins TestAmerica Sample Login Confirmation files from 280-145209 New York Ordinance Works (NYOW),AOC4

EXTERNAL EMAIL*

Hi Leia,

One correction for this sample confirmation: the samples logged as NYOW-04-PH075 and NYOW-04-PH074 on the COC and confirmation file should have the "-B" on the sample IDs that were on the container labels. They should be NYOW-04-PH075-B and NYOW-04-PH074-B .

Could you send a revised version once this change is made?

Thanks!

Molly Horning

From: Leia Wing <Leia.Wing@Eurofinset.com>
Sent: Friday, February 5, 2021 4:56 PM
To: Florence Sevold <fsevold@bluestoneenviro.com>; Laura Paolella <lpaolella@bluestoneenviro.com>; Molly Horning <mhorning@bluestoneenviro.com>; Rachel Urban <rurban@bluestoneenviro.com>
Subject: Please Read: Eurofins TestAmerica Sample Login Confirmation files from 280-145209 New York Ordinance Works (NYOW),AOC4

[EXTERNAL]

Hello,

Attached, please find the Sample Confirmation files for job 280-145209; New York Ordinance Works (NYOW),AOC4

Receipt Discrepancies:
The container labels for the following samples did not match the information listed on the Chain-of-Custody (COC): NYOW-04-PH075 (280-145209-18) and NYOW-04-PH074 (280-145209-19). The container labels state "-B" on the end of the sample IDs, while the COC does not. The samples were logged per the COC.

Please feel free to contact me or your PM, Patrick McEntee, if you have any questions.

Thank you.

Leia V Wing
Project Manager Assistant

Eurofins TestAmerica, Denver

E-mail: Leia.Wing@Eurofinset.com
www.eurofinsus.com/env



Reference: [280-696909]

Attachments: 2

> > Bank information has changed, please refer to remittance information on invoice. < <

* WARNING - EXTERNAL: This email originated from outside of Eurofins TestAmerica. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!

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4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225 eurofins Environment Testing America

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 3
Company: Bluestone Environmental Group Inc	PWSID:			
Address: 301 Lindenwood Drive	Due Date Requested:	Analysis Requested		Job #: W912WJ 19D0001 19F0056 0400 L
City: Malvern	TAT Requested (days): 15 business day			Preservation Codes:
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify)
Phone: (610) 647-9500 x 1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ 19D0001 19F0056 0400 L			Other:
Site: Baldwinsville, New York	SSOW#:			

280-145271 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-WL086-A	2/4/21	0820	G	W	N	N	-	2	2		4	
NYOW-04-WL085-A	2/4/21	0850	G	W	N	N	-	2	2		4	
NYOW-04-WL084-A	2/4/21	0940	G	W	N	N	-	2	2		4	
NYOW-04-WL082-A	2/4/21	1030	G	W	N	N	-	1	1		2	limited H_2O volume
NYOW-04-WL037-A	2/4/21	1050	G	W	N	N	-	1	1		2	limited H_2O volume
NYOW-04-WL080-A	2/4/21	1130	G	W	N	N	-	2	2		4	
NYOW-04-PH070-B	2/4/21	0830	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH069-B	2/4/21	0840	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH055-B	2/4/21	0910	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH054-B	2/4/21	0920	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH050-B	2/4/21	0940	G	S	N	N	1	1	-	✓	2	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:	Time:	Method of Shipment:	
Relinquished by:	Date/Time: 2/4/21 1505	Company: Bluestone	Received by:	Date/Time: 2/4/21 1505	Company: ES-SYR
Relinquished by:	Date/Time: 2-4-21, 1900	Company: Syr	Received by: FEDEX	Date/Time: 2-4-21, 1801	Company: FEDEX
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 02/05/2021, 0930	Company: ETA DEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 0.4, 1.9, 0.9, 0.7, 1.3, CF: +0.7, IR: 4

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse eurofins Environment Testing America

#225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 2 of 3
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ 19D0001 19F0056 0400 L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ 19D0001 19F0056 0400 L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	N	N	N	N	X	
NYOW-04-PH049-B	2/4/21	0955	G	S	N	N	1	1	—	✓	2	
NYOW-04-WL036-A	2/4/21	1220	G	W	N	N	—	2	2		4	
NYOW-04-SL003-A	2/4/21	1050	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH003-B	2/4/21	1055	G	S	N	N	1	1	—	✓	2	
NYOW-04-PH003-C	2/4/21	1100	G	S	N	N	1	1	—	✓	2	
NYOW-04-SL001-A	2/4/21	1200	G	S	N	Y	3	3	—	✓	6	
NYOW-04-PH001-B	2/4/21	1205	G	S	N	Y	3	3	—	✓	6	
NYOW-04-PH001-C	2/4/21	1210	G	S	N	N	1	1	—	✓	2	
~~NYOW-04~~ SG 2/4/21 PH-DUP-001_210204	2/4/21	0000	G	S	N	N	1	1	—	✓	2	
EB-01_210204	2/4/21	1400	G	W	N	N	—	2	2		4	
EB-02_210204	2/4/21	1415	G	W	N	N	—	2	2		4	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

	Date/Time	Company	Received by	Date/Time	Company
Relinquished by:	2/4/21	Bluestone		2/4/21 1505	FedEx
Relinquished by:	2-4-21, 1900	Syr	FedEx	2-4-21, 1905	FedEx
Relinquished by:	Date/Time:	Company	Received by:	02/05/2021, 09:30	Client

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 0.4, 1.9, 0.9, 0.7, 1.3, CF: +0.7, IR: 0

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse #225 — eurofins Environment Testing America

Client Information	Sampler	Lab PM	Carrier Tracking No(s)	COC No
Client Contact: Lori Paolella	Joe Maule	McEntee, Patrick J		
Company: Bluestone Environmental Group Inc	Phone: (610) 647-9500 x.1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 3 of 3
Address: 301 Lindenwood Drive	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
City: Malvern	Due Date Requested:			
State, Zip: PA, 19355	TAT Requested (days): 15 business day			
Phone: (610) 647-9500 x.1028	Compliance Project: Δ Yes Δ No			
Email: lpaolella@bluestoneenviro.com	PO #:			
Project Name: NYOW AOC4	WO #:			
Site: Baldwinsville, New York	Project #: W912WJ.19D0001.19F0056.0400.L			
	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-PH011-B	2/4/21	1315	G	S	N	N	1	1	-	✓	2	
NYOW-04-PH010-B	2/4/21	1330	G	S	N	N	1	1	-	✓	2	

Preservation Codes:
A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify); Other:

2/4/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	2/4/21	Bluestone	Received by:	2/4/21 1505	ES-SYR
Relinquished by: RCVD	2-4-21, 1900	SYR	Received by: FedEx	2-4-21, 1905	FEDEX
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 02/05/2021, 09:30	Company: ETA MEN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 0.4, 1.9, 0.9, 0.7, 1.3, CF: +0.2, FR: C,

Ver: 01/16/2019

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

Syracuse eurofins Environment Testing America

#225

Client Information	Sampler: Joe Maule	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Lori Paolella	Phone: (610) 647-9500 x 1028	E-Mail: Patrick.McEntee@Eurofinset.com	State of Origin: NY	Page: 1 of 1
Company: Bluestone Environmental Group Inc	PWSID:			Job #: W912WJ.19D0001.19F0056.0400.L
Address: 301 Lindenwood Drive	Due Date Requested:			
City: Malvern	TAT Requested (days): 15 business day			
State, Zip: PA, 19355	Compliance Project: Δ Yes Δ No			
Phone: (610) 647-9500 x.1028	PO #:			
Email: lpaolella@bluestoneenviro.com	WO #:			
Project Name: NYOW AOC4	Project #: W912WJ.19D0001.19F0056.0400.L			
Site: Baldwinsville, New York	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8330A Explosives (Picric Acid) (discrete soil)	8270D SVOCs (DNCB and 2,4-DNP)	8330B Explosives (Picric Acid) (aqueous)	Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N		
NYOW-04-WL038-A	2/5/21	0745	G	W	N	N	—	1	1	—	2	limited H_2O volume.
NYOW-04-WL001-A	2/5/21	0830	G	W	N	Y	—	6	6	—	12	
NYOW-04-WL003-A	2/5/21	0950	G	W	N	N	—	2	2	—	4	
EB-01_210205	2/5/21	1030	G	W	N	N	—	2	2	—	4	

280-145317 Chain of Custody

2/5/21

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time	Company	Received by:	Date/Time	Company
1		2/5/21 1200	Bluestone		2-5-21, 12:00	Syn
2		2-5-21, 1900	Syn		2-5-21, 1905	FEDEX
3		Date/Time:	Company	Received by:	2/6/2021 11:05	ETA Den

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.: 140248 / 140248	Cooler Temperature(s) °C and Other Remarks: 3.6/2.8 IR9 (F+0.2

Ver: 01/16/2019

MICROVISION LABORATORIES, INC.

Chain Of Custody

MicroVision Labs Job#: 14258

Client Information

Client: Bluestone Environmental

Billing Address: 301 Lindenwood Drive, Ste 102
Malvern PA, 19355

Phone: (610) 647-9500 x1028

Fax:

Email: lpaolella@bluestoneenviro.com

Project Information

Project Name: New York Ordnace Works - AOC5

Project Location: Baldwinsville, NY

Project Number: W912WJ.19D0001.19F0056.0400.L

Project Manager: Michael Badeau

PO#:

Sample ID	Collected Date	Sampler's Initials	Requested Analyses: Coal Ash Test	Lead Paint	SEM/EDS	PLM/Light Microscopy	Soot ID	Dust ID	Unknow, Mat'l ID	FTIR	Polished Cross Section	Particle Size Analysis	Wildfire	Other
1) NYOW-05-SL010-A	1/7/21	JM	1											
2) NYOW-05-SL009-A	1/7/21	JM	1											
3) NYOW-05-SL008-A	1/7/21	JM	1											
4) NYOW-05-SL007-A	1/7/21	JM	1											
5) NYOW-05-SL006-A	1/8/21	JM	1											
6) NYOW-05-SL024-A	1/8/21	JM	1											
7) NYOW-05-SL023-A	1/8/21	JM	1											
8) NYOW-05-SL022-A	1/8/21	JM	1											
9) NYOW-05-SL021-A	1/8/21	JM	1											
10) NYOW-05-SL025-A	1/11/21	SG	1											
11) SL-DUP-001-210108	1/8/21	JM	1											
12)													SG	1/11/21

Relinquished By:	Date/Time	Received By:	Date/Time
	1/11/21 1600	Julie Stobo	1/12/2021

Turn Around Time and Notes:

TAT- 15 day (standard)

Hazardous Contaminants: YES / NO If Yes, please list:

Analytical Report Requested: YES / NO

MicroVision Laboratories, Inc.
187 Billerica Road, Chelmsford, MA 01824
Phone 978-250-9909 Fax 978-250-9901 Toll Free 1-877-250-9909
microvisionlabs.com

APPENDIX J
Validated Analytical Results

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Note: Laboratory and validation reports are available in FUDSChem and will be provided as appendices in subsequent documents.

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Table J-1
Validated Analytical Results - AOC 4 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

						Method	SVOCs (SW8270D)		Explosives (SW8330A)
						Analyte	2,4-Dinitrochlorobenzene	2,4-Dinitrophenol	Picric Acid
						Units	µg/kg	µg/kg	µg/kg
						PAL	600	61	6.1
Location ID	**Parent Sample ID**	**Sample ID**	**Sample Type**	**Depth (feet)**	**Date**	**PAL Reference**	QAPP Appendix A.1 - Soil	EPA Region 4 Soil	QAPP Appendix A.1 - Soil
NYOW-04-001	NYOW-04-SL001-A	NYOW-04-SL001-A	N	0 - 1	2/4/2021		390 UJ	*1500 U*	*150 UJ*
	NYOW-04-PH001-B	NYOW-04-PH001-B	N	1 - 5	2/4/2021		380 UJ	*1500 U*	*150 U*
	NYOW-04-PH001-C	NYOW-04-PH001-C	N	5 - 10	2/4/2021		370 UJ	*1500 U*	*150 U*
		PH-DUP-001_210204	FD	5 - 10	2/4/2021		370 U	*1500 U*	*160 U*
NYOW-04-002	NYOW-04-SL002-A	NYOW-04-SL002-A	N	0 - 1	1/28/2021		410 U	*1600 U*	*160 U*
		SL-DUP-002_210128	FD	0 - 1	1/28/2021		380 U	*1500 U*	*160 U*
	NYOW-04-PH002-B	NYOW-04-PH002-B	N	1 - 5	1/28/2021		380 U	*1500 U*	*160 U*
	NYOW-04-PH002-C	NYOW-04-PH002-C	N	5 - 10	1/28/2021		360 U	*1400 U*	*150 UJ*
NYOW-04-003	NYOW-04-SL003-A	NYOW-04-SL003-A	N	0 - 1	2/4/2021		370 UJ	*1500 U*	*160 U*
	NYOW-04-PH003-B	NYOW-04-PH003-B	N	1 - 5	2/4/2021		370 UJ	*1500 U*	*160 U*
	NYOW-04-PH003-C	NYOW-04-PH003-C	N	5 - 10	2/4/2021		370 UJ	*1500 U*	*150 U*
NYOW-04-004	NYOW-04-SL004-A	NYOW-04-SL004-A	N	0 - 1	1/29/2021		360 U	*1400 U*	*160 U*
	NYOW-04-PH004-B	NYOW-04-PH004-B	N	1 - 5	1/29/2021		440 U	*1700 U*	*160 U*
	NYOW-04-PH004-C	NYOW-04-PH004-C	N	5 - 10	1/29/2021		390 U	*1500 U*	*160 U*
NYOW-04-005	NYOW-04-SL005-A	NYOW-04-SL005-A	N	0 - 1	1/29/2021		360 U	*1400 U*	*160 U*
	NYOW-04-PH005-B	NYOW-04-PH005-B	N	1 - 5	1/29/2021		380 U	*1500 U*	*160 U*
	NYOW-04-PH005-C	NYOW-04-PH005-C	N	5 - 10	1/29/2021		380 U	*1500 U*	*160 U*
NYOW-04-006	NYOW-04-SL006-A	NYOW-04-SL006-A	N	0 - 1	2/3/2021		380 U	*1500 U*	*160 U*
	NYOW-04-PH006-B	NYOW-04-PH006-B	N	1 - 5	2/3/2021		370 U	*1400 U*	*150 U*
	NYOW-04-PH006-C	NYOW-04-PH006-C	N	5 - 10	2/3/2021		360 U	*1400 U*	*150 U*
		PH-DUP-002_210203	FD	5 - 10	2/3/2021		360 U	*1400 U*	*150 U*
NYOW-04-007	NYOW-04-PH007-B	NYOW-04-PH007-B	N	1 - 5	1/25/2021		370 UJ	*1500 U*	*150 U*
NYOW-04-008	NYOW-04-PH008-B	NYOW-04-PH008-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*160 U*
NYOW-04-009	NYOW-04-PH009-B	NYOW-04-PH009-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*160 U*
NYOW-04-010	NYOW-04-PH010-B	NYOW-04-PH010-B	N	1 - 5	2/4/2021		370 UJ	*1400 U*	*160 U*
NYOW-04-011	NYOW-04-PH011-B	NYOW-04-PH011-B	N	1 - 5	2/4/2021		360 UJ	*1400 U*	*150 U*
NYOW-04-012	NYOW-04-PH012-B	NYOW-04-PH012-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*160 U*
NYOW-04-013	NYOW-04-PH013-B	NYOW-04-PH013-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*160 U*
NYOW-04-014	NYOW-04-PH014-B	NYOW-04-PH014-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*160 U*
NYOW-04-015	NYOW-04-PH015-B	NYOW-04-PH015-B	N	1 - 5	1/27/2021		360 U	*1400 U*	*160 U*
NYOW-04-016	NYOW-04-PH016-B	NYOW-04-PH016-B	N	1 - 5	1/27/2021		350 U	*1400 U*	*160 U*
		PH-DUP-002_210127	FD	1 - 5	1/27/2021		350 U	*1400 U*	*160 U*
NYOW-04-017	NYOW-04-PH017-B	NYOW-04-PH017-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*150 U*
NYOW-04-018	NYOW-04-PH018-B	NYOW-04-PH018-B	N	1 - 5	1/25/2021		360 U	*1400 U*	*150 U*
NYOW-04-019	NYOW-04-PH019-B	NYOW-04-PH019-B	N	1 - 5	1/25/2021		360 U	*1400 UJ*	*160 U*
NYOW-04-020	NYOW-04-PH020-B	NYOW-04-PH020-B	N	1 - 5	1/27/2021		340 U	*1300 U*	*160 U*
NYOW-04-021	NYOW-04-PH021-B	NYOW-04-PH021-B	N	1 - 5	1/27/2021		350 U	*1400 U*	*160 U*
NYOW-04-022	NYOW-04-PH022-B	NYOW-04-PH022-B	N	1 - 5	1/25/2021		340 U	*1400 UJ*	*160 U*
NYOW-04-023	NYOW-04-PH023-B	NYOW-04-PH023-B	N	1 - 5	1/25/2021		370 U	*1400 UJ*	*160 U*
NYOW-04-024	NYOW-04-PH024-B	NYOW-04-PH024-B	N	1 - 5	1/25/2021		360 U	*1400 UJ*	*160 U*

Table J-1
Validated Analytical Results - AOC 4 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

						Method	SVOCs (SW8270D)		Explosives (SW8330A)
						Analyte	2,4-Dinitrochlorobenzene	2,4-Dinitrophenol	Picric Acid
						Units	µg/kg	µg/kg	µg/kg
						PAL	600	61	6.1
Location ID	**Parent Sample ID**	**Sample ID**	**Sample Type**	**Depth (feet)**	**Date**	**PAL Reference**	QAPP Appendix A.1 - Soil	EPA Region 4 Soil	QAPP Appendix A.1 - Soil
NYOW-04-025	NYOW-04-PH025-B	NYOW-04-PH025-B	N	1 - 5	1/25/2021		350 U	*1400 UJ*	*160 U*
NYOW-04-026	NYOW-04-PH026-B	NYOW-04-PH026-B	N	1 - 5	1/27/2021		360 U	*1400 U*	*150 U*
		PH-DUP-003_210127	FD	1 - 5	1/27/2021		350 U	*1400 U*	*150 U*
NYOW-04-027	NYOW-04-PH027-B	NYOW-04-PH027-B	N	1 - 5	1/27/2021		370 U	*1400 U*	*160 U*
NYOW-04-028	NYOW-04-PH028-B	NYOW-04-PH028-B	N	1 - 5	1/25/2021		350 U	*1400 UJ*	*160 U*
NYOW-04-029	NYOW-04-PH029-B	NYOW-04-PH029-B	N	1 - 5	1/25/2021		360 U	*1400 UJ*	*150 U*
NYOW-04-030	NYOW-04-PH030-B	NYOW-04-PH030-B	N	1 - 5	1/25/2021		350 U	*1400 UJ*	*150 U*
NYOW-04-031	NYOW-04-PH031-B	NYOW-04-PH031-B	N	1 - 5	1/27/2021		350 U	*1400 U*	*160 U*
NYOW-04-032	NYOW-04-PH032-B	NYOW-04-PH032-B	N	1 - 5	1/27/2021		360 U	*1400 U*	*160 U*
NYOW-04-033	NYOW-04-PH033-B	NYOW-04-PH033-B	N	1 - 5	1/25/2021		350 U	*1400 UJ*	*150 U*
NYOW-04-034	NYOW-04-PH034-B	NYOW-04-PH034-B	N	1 - 5	1/25/2021		370 U	*1500 UJ*	*160 U*
NYOW-04-035	NYOW-04-PH035-B	NYOW-04-PH035-B	N	1 - 5	1/25/2021		400 U	*1600 UJ*	*160 U*
NYOW-04-036	NYOW-04-SL036-A	NYOW-04-SL036-A	N	0 - 1	2/2/2021		380 U	*1500 U*	*150 U*
	NYOW-04-PH036-B	NYOW-04-PH036-B	N	1 - 5	2/2/2021		370 U	*1400 U*	*160 U*
		PH-DUP-001_210202	FD	1 - 5	2/2/2021		380 U	*1500 U*	*160 UJ*
	NYOW-04-PH036-C	NYOW-04-PH036-C	N	5 - 10	2/2/2021		370 U	*1400 U*	*160 U*
NYOW-04-037	NYOW-04-SL037-A	NYOW-04-SL037-A	N	0 - 1	2/3/2021		360 U	*1400 U*	*150 U*
	NYOW-04-PH037-B	NYOW-04-PH037-B	N	1 - 5	2/3/2021		370 U	*1500 U*	*150 U*
	NYOW-04-PH037-C	NYOW-04-PH037-C	N	5 - 10	2/3/2021		360 U	*1400 U*	*150 U*
NYOW-04-038	NYOW-04-SL038-A	NYOW-04-SL038-A	N	0 - 1	2/3/2021		380 U	*1500 U*	*150 U*
	NYOW-04-PH038-B	NYOW-04-PH038-B	N	1 - 5	2/3/2021		360 U	*1400 U*	*160 U*
	NYOW-04-PH038-C	NYOW-04-PH038-C	N	5 - 10	2/3/2021		390 U	*1500 U*	*150 U*
NYOW-04-039	NYOW-04-PH039-B	NYOW-04-PH039-B	N	1 - 5	1/26/2021		350 UJ	*1400 UJ*	*150 U*
NYOW-04-040	NYOW-04-PH040-B	NYOW-04-PH040-B	N	1 - 5	1/26/2021		350 UJ	*1400 UJ*	*150 U*
NYOW-04-041	NYOW-04-PH041-B	NYOW-04-PH041-B	N	1 - 5	1/26/2021		400 UJ	*1600 UJ*	*160 U*
NYOW-04-042	NYOW-04-PH042-B	NYOW-04-PH042-B	N	1 - 5	1/27/2021		380 U	*1500 U*	*160 U*
NYOW-04-043	NYOW-04-PH043-B	NYOW-04-PH043-B	N	1 - 5	1/27/2021		380 U	*1500 U*	*160 U*
		PH-DUP-001_210127	FD	1 - 5	1/27/2021		400 U	*1600 U*	*150 U*
NYOW-04-044	NYOW-04-PH044-B	NYOW-04-PH044-B	N	1 - 5	1/26/2021		390 UJ	*1500 UJ*	*160 U*
NYOW-04-045	NYOW-04-PH045-B	NYOW-04-PH045-B	N	1 - 5	1/26/2021		360 UJ	*1400 UJ*	*160 U*
NYOW-04-046	NYOW-04-PH046-B	NYOW-04-PH046-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*160 U*
NYOW-04-047	NYOW-04-PH047-B	NYOW-04-PH047-B	N	1 - 5	1/26/2021		380 UJ	*1500 UJ*	*150 U*
NYOW-04-048	NYOW-04-PH048-B	NYOW-04-PH048-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*160 U*
NYOW-04-049	NYOW-04-PH049-B	NYOW-04-PH049-B	N	1 - 5	2/4/2021		350 UJ	*1400 U*	*150 U*
NYOW-04-050	NYOW-04-PH050-B	NYOW-04-PH050-B	N	1 - 5	2/4/2021		360 UJ	*1400 U*	*150 U*
NYOW-04-051	NYOW-04-PH051-B	NYOW-04-PH051-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*150 U*
NYOW-04-052	NYOW-04-PH052-B	NYOW-04-PH052-B	N	1 - 5	1/26/2021		370 UJ	*1400 UJ*	*160 UJ*
NYOW-04-053	NYOW-04-PH053-B	NYOW-04-PH053-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*160 U*
		PH-DUP-001_210126	FD	1 - 5	1/26/2021		360 UJ	*1400 UJ*	*160 U*
NYOW-04-054	NYOW-04-PH054-B	NYOW-04-PH054-B	N	1 - 5	2/4/2021		380 UJ	*1500 U*	*150 U*

Table J-1
Validated Analytical Results - AOC 4 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

						Method	SVOCs (SW8270D)		Explosives (SW8330A)
						Analyte	2,4-Dinitrochlorobenzene	2,4-Dinitrophenol	Picric Acid
						Units	µg/kg	µg/kg	µg/kg
						PAL	600	61	6.1
Location ID	**Parent Sample ID**	**Sample ID**	**Sample Type**	**Depth (feet)**	**Date**	**PAL Reference**	QAPP Appendix A.1 - Soil	EPA Region 4 Soil	QAPP Appendix A.1 - Soil
NYOW-04-055	NYOW-04-PH055-B	NYOW-04-PH055-B	N	1 - 5	2/4/2021		360 UJ	*1400 U*	*160 U*
NYOW-04-056	NYOW-04-PH056-B	NYOW-04-PH056-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*160 U*
NYOW-04-057	NYOW-04-PH057-B	NYOW-04-PH057-B	N	1 - 5	1/26/2021		360 UJ	*1400 UJ*	*160 U*
NYOW-04-058	NYOW-04-PH058-B	NYOW-04-PH058-B	N	1 - 5	1/26/2021		380 UJ	*1500 UJ*	*160 U*
NYOW-04-059	NYOW-04-PH059-B	NYOW-04-PH059-B	N	1 - 5	1/27/2021		350 U	*1400 U*	*160 U*
NYOW-04-060	NYOW-04-PH060-B	NYOW-04-PH060-B	N	1 - 5	1/27/2021		370 U	*1400 U*	*160 U*
NYOW-04-061	NYOW-04-PH061-B	NYOW-04-PH061-B	N	1 - 5	1/26/2021		380 UJ	*1500 UJ*	*150 U*
NYOW-04-062	NYOW-04-PH062-B	NYOW-04-PH062-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*160 U*
NYOW-04-063	NYOW-04-PH063-B	NYOW-04-PH063-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*160 U*
		PH-DUP-002_210126	FD	1 - 5	1/26/2021		390 UJ	*1500 UJ*	*160 U*
NYOW-04-064	NYOW-04-PH064-B	NYOW-04-PH064-B	N	1 - 5	1/27/2021		380 U	*1500 U*	*160 U*
NYOW-04-065	NYOW-04-PH065-B	NYOW-04-PH065-B	N	1 - 5	1/27/2021		370 U	*1500 U*	*160 U*
NYOW-04-066	NYOW-04-PH066-B	NYOW-04-PH066-B	N	1 - 5	1/26/2021		370 UJ	*1500 UJ*	*150 U*
NYOW-04-067	NYOW-04-PH067-B	NYOW-04-PH067-B	N	1 - 5	1/26/2021		360 U	*1400 U*	*160 U*
NYOW-04-068	NYOW-04-PH068-B	NYOW-04-PH068-B	N	1 - 5	1/26/2021		360 U	*1400 U*	*160 U*
NYOW-04-069	NYOW-04-PH069-B	NYOW-04-PH069-B	N	1 - 5	2/4/2021		370 UJ	*1400 U*	*150 U*
NYOW-04-070	NYOW-04-PH070-B	NYOW-04-PH070-B	N	1 - 5	2/4/2021		380 UJ	*1500 U*	*160 U*
NYOW-04-071	NYOW-04-PH071-B	NYOW-04-PH071-B	N	1 - 5	1/26/2021		360 UJ	*1400 UJ*	*160 U*
NYOW-04-072	NYOW-04-PH072-B	NYOW-04-PH072-B	N	1 - 5	1/26/2021		350 U	*1400 U*	*160 U*
NYOW-04-073	NYOW-04-PH073-B	NYOW-04-PH073-B	N	1 - 5	1/26/2021		370 U	*1500 U*	*160 U*
NYOW-04-074	NYOW-04-PH074-B	NYOW-04-PH074-B	N	1 - 5	2/3/2021		370 U	*1400 U*	*160 U*
		PH-DUP-003_210203	FD	1 - 5	2/3/2021		370 U	*1400 U*	*160 U*
NYOW-04-075	NYOW-04-PH075-B	NYOW-04-PH075-B	N	1 - 5	2/3/2021		360 U	*1400 U*	*150 U*
NYOW-04-076	NYOW-04-PH076-B	NYOW-04-PH076-B	N	1 - 5	1/26/2021		360 U	*1400 U*	*160 U*
NYOW-04-077	NYOW-04-PH077-B	NYOW-04-PH077-B	N	1 - 5	1/26/2021		370 U	*1500 U*	*150 U*
NYOW-04-078	NYOW-04-PH078-B	NYOW-04-PH078-B	N	1 - 5	1/26/2021		390 U	*1500 U*	*160 U*
NYOW-04-079	NYOW-04-SL079-A	NYOW-04-SL079-A	N	0 - 1	1/28/2021		400 U	*1600 U*	*160 U*
	NYOW-04-PH079-B	NYOW-04-PH079-B	N	1 - 5	1/28/2021		400 U	*1600 UJ*	*160 U*
	NYOW-04-PH079-C	NYOW-04-PH079-C	N	5 - 10	1/28/2021		370 U	*1400 U*	*160 U*
NYOW-04-080	NYOW-04-SL080-A	NYOW-04-SL080-A	N	0 - 1	2/2/2021		420 U	*1600 U*	*150 U*
	NYOW-04-PH080-B	NYOW-04-PH080-B	N	1 - 5	2/2/2021		390 U	*1500 U*	*150 U*
	NYOW-04-PH080-C	NYOW-04-PH080-C	N	5 - 10	2/2/2021		350 U	*1400 U*	*160 U*
NYOW-04-081	NYOW-04-SL081-A	NYOW-04-SL081-A	N	0 - 1	1/28/2021		370 U	*1500 U*	*160 U*
		SL-DUP-001_210128	FD	0 - 1	1/28/2021		390 U	*1500 U*	*160 U*
	NYOW-04-PH081-B	NYOW-04-PH081-B	N	1 - 5	1/28/2021		360 U	*1400 U*	*160 U*
		PH-DUP-001_210128	FD	1 - 5	1/28/2021		360 U	*1400 U*	*160 U*
	NYOW-04-PH081-C	NYOW-04-PH081-C	N	5 - 10	1/28/2021		360 U	*1400 U*	*160 U*
NYOW-04-082	NYOW-04-SL082-A	NYOW-04-SL082-A	N	0 - 1	2/2/2021		360 U	*1400 U*	*160 U*
	NYOW-04-PH082-B	NYOW-04-PH082-B	N	1 - 5	2/2/2021		430 U	*1700 U*	*160 U*
	NYOW-04-PH082-C	NYOW-04-PH082-C	N	5 - 10	2/2/2021		350 U	*1400 U*	*160 U*

Table J-1
Validated Analytical Results - AOC 4 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

						Method	SVOCs (SW8270D)		Explosives (SW8330A)
						Analyte	2,4-Dinitrochlorobenzene	2,4-Dinitrophenol	Picric Acid
						Units	µg/kg	µg/kg	µg/kg
						PAL	600	61	6.1
Location ID	**Parent Sample ID**	**Sample ID**	**Sample Type**	**Depth (feet)**	**Date**	**PAL Reference**	QAPP Appendix A.1 - Soil	EPA Region 4 Soil	QAPP Appendix A.1 - Soil
NYOW-04-083	NYOW-04-SL083-A	NYOW-04-SL083-A	N	0 - 1	1/27/2021		360 U	*1400 U*	*160 U*
	NYOW-04-PH083-B	NYOW-04-PH083-B	N	1 - 5	1/27/2021		370 U	*1500 U*	*160 U*
	NYOW-04-PH083-C	NYOW-04-PH083-C	N	5 - 10	1/27/2021		350 U	*1400 U*	*150 U*
NYOW-04-084	NYOW-04-SL084-A	NYOW-04-SL084-A	N	0 - 1	2/3/2021		350 U	*1400 U*	*150 U*
	NYOW-04-PH084-B	NYOW-04-PH084-B	N	1 - 5	2/3/2021		360 U	*1400 U*	*150 UJ*
	NYOW-04-PH084-C	NYOW-04-PH084-C	N	5 - 10	2/3/2021		370 U	*1500 U*	*160 U*
NYOW-04-085	NYOW-04-SL085-A	NYOW-04-SL085-A	N	0 - 1	2/3/2021		380 U	*1500 U*	*160 U*
	NYOW-04-PH085-B	NYOW-04-PH085-B	N	1 - 5	2/3/2021		360 U	*1400 U*	*160 U*
		PH-DUP-001_210203	FD	1 - 5	2/3/2021		380 U	*1500 U*	*150 U*
	NYOW-04-PH085-C	NYOW-04-PH085-C	N	5 - 10	2/3/2021		360 U	*1400 U*	*160 UJ*

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.

References

EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
QAPP Appendix A.1 - UFP QAPP, Former New York Ordnance Works, FUDS Property Number C02NY0290, Baldwinsville, New York. December 2020. Prepared by Bluestone Environmental Group.

Table J-2
Validated Analytical Results - AOC 4 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

						Method	SVOCs (SW8270D)		Explosives (SW8330B)
						Analyte	2,4-Dinitrochlorobenzene	2,4-Dinitrophenol	Picric Acid
						Units	µg/L	µg/L	µg/L
						PAL	NA	3.9	4
Location ID	**Parent Sample ID**	**Sample ID**	**Sample Type**	**Depth (feet)**	**Date**	**PAL Reference**	NA	2021 May EPA Tapwater (THQ 0.1)	2021 May EPA Tapwater (THQ 0.1)
NYOW-04-001	NYOW-04-WL001-A	NYOW-04-WL001-A	N	7 - 17	2/5/2021		10 UJ	*21 U*	0.34 UJ
NYOW-04-002	NYOW-04-WL002-A	NYOW-04-WL002-A	N	4 - 12	2/1/2021		11 UJ	*22 U*	0.12 U
NYOW-04-003	NYOW-04-WL003-A	NYOW-04-WL003-A	N	6 - 16	2/5/2021		10 U	*21 U*	*8.5 UJ*
NYOW-04-004	NYOW-04-WL004-A	NYOW-04-WL004-A	N	6 - 16	2/1/2021		11 UJ	*21 U*	0.24 UJ
		WL-DUP-002_210201	FD	6 - 16	2/1/2021		10 U	*20 U*	0.12 U
NYOW-04-005	NYOW-04-WL005-A	NYOW-04-WL005-A	N	7 - 17	2/1/2021		12 UJ	*23 U*	0.13 U
NYOW-04-006	NYOW-04-WL006-A	NYOW-04-WL006-A	N	4 - 12	2/4/2021		10 U	*20 U*	0.35 UJ
NYOW-04-036	NYOW-04-WL036-A	NYOW-04-WL036-A	N	5.5 - 15.5	2/4/2021		10 U	*20 U*	0.78 U
NYOW-04-037	NYOW-04-WL037-A	NYOW-04-WL037-A	N	3 - 13	2/4/2021		9.9 U	*20 U*	0.25 UJ
NYOW-04-038	NYOW-04-WL038-A	NYOW-04-WL038-A	N	4 - 11	2/5/2021		10 U	*20 U*	0.12 U
NYOW-04-079	NYOW-04-WL079-A	NYOW-04-WL079-A	N	9.8 - 19.8	2/1/2021		10 UJ	*20 U*	0.12 UJ
		WL-DUP-001_210201	FD	9.8 - 19.8	2/1/2021		10 U	*20 U*	1.5 UJ
NYOW-04-080	NYOW-04-WL080-A	NYOW-04-WL080-A	N	5 - 15	2/4/2021		10 UJ	*21 U*	X
NYOW-04-081	NYOW-04-WL081-A	NYOW-04-WL081-A	N	8.5 - 18.5	2/1/2021		11 UJ	*22 U*	0.14 U
NYOW-04-082	NYOW-04-WL082-A	NYOW-04-WL082-A	N	5 - 15	2/4/2021		10 UJ	*21 UJ*	0.13 U
NYOW-04-083	NYOW-04-WL083-A	NYOW-04-WL083-A	N	10.5 - 20.5	2/1/2021		10 UJ	*21 U*	1.9 U
NYOW-04-084	NYOW-04-WL084-A	NYOW-04-WL084-A	N	9 - 19	2/4/2021		9.8 U	*20 U*	0.12 U
NYOW-04-085	NYOW-04-WL085-A	NYOW-04-WL085-A	N	3.5 - 10.5	2/4/2021		10 U	*20 U*	0.12 U

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested

"-A" in sample ID indicates shallow water-bearing zone.

FD - field duplicate sample

N - normal sample

NA - not applicable

WL - temporary well groundwater sample

Validation Qualifiers

U - Non-detect at Limit of Detection (LOD).

UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.

X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Tapwater (THQ 0.1) - Environmental Protection Agency May 2021 Tapwater Regional Screening Levels (Total Hazard Quotient = 0.1, Target Risk = 1E-06)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-001				NYOW-05-002			
				Parent Sample ID	NYOW-05-SL001-A	NYOW-05-PH001-B	NYOW-05-PH001-C		NYOW-05-SL002-A		NYOW-05-PH002-B	NYOW-05-PH002-C
				Sample ID	NYOW-05-SL001-A	NYOW-05-PH001-B	NYOW-05-PH001-C	PH-DUP-001_210112	NYOW-05-SL002-A	SL-DUP-001_210112	NYOW-05-PH002-B	NYOW-05-PH002-C
				Sample Type	N	N	N	FD	N	FD	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	5 - 10	0 - 1	0 - 1	1 - 5	5 - 10
				Date	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**								
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	5.2 U	5.1 U	5.2 U	---	---	5.1 U	5.3 U
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	2.6 U	2.6 U	2.6 U	---	---	2.5 U	2.7 U
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	2.6 U	2.6 U	2.6 U	---	---	2.5 U	2.7 U
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	8.2 U	8 U	8.2 U	---	---	8 U	8.3 U
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	0.33 U	0.32 U	0.33 U	---	---	0.32 U	0.33 U
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	**7.8 J**	10 U	10 U	---	---	10 U	11 U
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	10 U	10 U	10 U	---	---	10 U	11 U
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	10 U	10 U	10 U	---	---	10 U	11 U
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	**69**	58 U	59 U	---	---	57 U	60 U
	Benzene	µg/kg	120	EPA Region 4 Soil	---	0.33 U	0.32 U	0.33 U	---	---	**0.48 J**	0.33 U
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	4.2 U	4.1 U	4.2 U	---	---	4.1 U	4.2 U
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	*2.6 U*	*2.6 U*	*2.6 U*	---	---	*2.5 U*	*2.7 U*
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	5.2 U	5.1 U	5.2 U	---	---	5.1 U	5.3 U
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	0.33 U	0.32 U	0.33 U	---	---	0.32 U	0.33 U
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	5.2 U	5.1 U	5.2 U	---	---	5.1 U	5.3 U
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	2.6 U	2.6 U	2.6 U	---	---	2.5 U	2.7 U
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	6.6 U	6.4 U	6.6 U	---	---	6.4 U	6.6 U
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	5.2 U	5.1 U	5.2 U	---	---	5.1 U	5.3 U
	Methylcyclohexane	µg/kg	NA		---	1.3 U	1.3 U	1.3 U	---	---	1.3 U	1.3 U
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	2.6 U	2.6 U	2.6 U	---	---	2.5 U	2.7 U
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	4.1 U	4 U	4.1 U	---	---	4 U	4.2 U
	Toluene	µg/kg	150	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	**0.58 J**	0.66 U
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	0.66 U	0.64 U	0.66 U	---	---	0.64 U	0.66 U
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	0.16 U	0.16 U	0.16 U	---	---	0.16 U	0.17 U
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	8.2 U	8 U	8.2 U	---	---	8 U	8.3 U
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	2.6 U	2.6 U	2.6 U	---	---	2.5 U	2.7 U
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	350 U	370 U	370 U	380 U	380 UJ	410 U	370 U	370 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*88 UJ*	*94 U*	*93 U*	*96 U*	*96 U*	*100 U*	*93 U*	*93 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	71 UJ	76 U	75 U	78 U	78 U	83 U	75 U	75 U
	2,4,6-Trichlorophenol	µg/kg	NA		71 UJ	76 U	75 U	78 U	78 U	83 U	75 U	75 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*71 UJ*	*76 U*	*75 U*	*78 U*	*78 U*	*83 U*	*75 U*	*75 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*71 UJ*	*76 U*	*75 U*	*78 U*	*78 U*	*83 U*	*75 U*	*75 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	88 U	94 U	93 U	96 U	96 UJ	100 U	93 U	93 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-001				NYOW-05-002			
				Parent Sample ID	NYOW-05-SL001-A	NYOW-05-PH001-B	NYOW-05-PH001-C		NYOW-05-SL002-A		NYOW-05-PH002-B	NYOW-05-PH002-C
				Sample ID	NYOW-05-SL001-A	NYOW-05-PH001-B	NYOW-05-PH001-C	PH-DUP-001_210112	NYOW-05-SL002-A	SL-DUP-001_210112	NYOW-05-PH002-B	NYOW-05-PH002-C
				Sample Type	N	N	N	FD	N	FD	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	5 - 10	0 - 1	0 - 1	1 - 5	5 - 10
				Date	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**								
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*71 UJ*	*76 U*	*75 U*	*78 U*	*78 U*	*83 U*	*75 U*	*75 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	71 UJ	76 U	75 U	78 U	78 U	83 U	75 U	75 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*180 U*	*190 U*	*190 U*	*200 U*	*200 UJ*	*210 U*	*190 U*	*190 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	71 UJ	76 U	75 U	78 U	78 U	83 U	75 U	75 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	3-Nitroaniline	µg/kg	NA		88 U	94 U	93 U	96 U	96 UJ	100 U	93 U	93 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*350 UJ*	*370 U*	*370 U*	*380 U*	*380 U*	*410 U*	*370 U*	*370 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		71 UJ	76 UJ	75 UJ	78 UJ	78 UJ	83 UJ	75 UJ	75 UJ
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	71 UJ	76 U	75 U	78 U	78 U	83 U	75 U	75 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	88 U	94 U	93 U	96 U	96 UJ	100 U	93 U	93 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	88 U	94 U	93 U	96 U	96 UJ	100 U	93 U	93 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	710 UJ	760 U	750 U	780 U	780 U	830 U	750 U	750 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	**63 J**	190 UJ	190 UJ	200 UJ	200 UJ	210 UJ	190 UJ	190 UJ
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*350 U*	*370 U*	*370 U*	*380 U*	*380 UJ*	*410 U*	*370 U*	*370 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	88 U	94 U	93 U	96 U	96 UJ	100 U	93 U	93 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	180 U	190 U	190 U	200 U	200 UJ	210 U	190 U	190 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	71 UJ	76 U	75 U	78 U	78 U	*83 U*	75 U	75 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	*83 U*	75 U	75 U
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*71 U*	*76 U*	*75 U*	*78 U*	*78 UJ*	*83 U*	*75 U*	*75 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	71 U	76 U	75 U	78 U	78 UJ	*83 U*	75 U	75 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	71 U	76 U	75 U	78 U	78 UJ	83 U	75 U	75 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	710 UJ	760 UJ	750 UJ	780 UJ	780 UJ	830 UJ	750 UJ	750 UJ
	Phenol	µg/kg	790	EPA Region 4 Soil	71 UJ	76 U	75 U	78 U	78 U	83 U	75 U	75 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	2.1 U	2.3 U	2 U	2.1 U	**12**	**8.4 J**	2.1 U	**1.5 J**
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	2.1 U	2.3 U	2 U	2.1 U	**15**	**11 J**	2.1 U	**4 J**
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	1.1 U	1.2 U	1.1 U	1.1 U	**6.9 J**	1.3 U	1.1 U	1.1 U
	Acenaphthylene	µg/kg	NA		1.1 U	1.2 U	1.1 U	1.1 U	1.2 U	1.3 U	1.1 U	1.1 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	4.5 U	5 U	4.4 U	4.5 U	**18 J**	5.2 U	4.5 U	4.5 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**2.4 J**	5 U	4.4 U	**2.7 J**	**34 J**	**6.4 J**	4.5 U	4.5 U
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	4.5 U	5 U	4.4 U	4.5 U	**27 J**	**5.4 J**	4.5 U	4.5 U
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	6.9 U	7.7 U	6.8 U	**3.3 J**	**35 J**	**9.3 J**	6.9 U	7 U
	Benzo[g,h,i]perylene	µg/kg	NA		6.9 U	7.7 U	6.8 U	7 U	**16 J**	8 U	6.9 U	7 U
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	4.5 U	5 U	4.4 U	4.5 U	**13**	**3.2 J**	4.5 U	4.5 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**3.5 J**	5 U	4.4 U	**6.1 J**	**33 J**	**8.9 J**	4.5 U	4.5 U
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	6.9 U	7.7 U	6.8 U	7 U	7.7 U	8 U	6.9 U	7 U
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**4.9 J**	**2.4 J**	4.4 U	**8.2 J**	**86 J**	**15 J**	4.5 U	4.5 U
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	2.8 U	3.1 U	2.7 U	2.8 U	**9 J**	3.2 U	2.8 U	2.8 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	6.9 U	7.7 U	6.8 U	7 U	**18 J**	**4.3 J**	6.9 U	7 U
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**1.8 J**	2.3 U	2 U	2.1 U	**12**	**8 J**	**1 J**	**7.1 J**
	Phenanthrene	µg/kg	NA		**3 J**	7.7 U	6.8 U	**4 J**	**82 J**	**10 J**	6.9 U	7 U
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**4.2 J**	7.7 U	6.8 U	**8.8 J**	**75 J**	**14 J**	6.9 U	7 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-001				NYOW-05-002			
				Parent Sample ID	NYOW-05-SL001-A	NYOW-05-PH001-B	NYOW-05-PH001-C		NYOW-05-SL002-A		NYOW-05-PH002-B	NYOW-05-PH002-C
				Sample ID	NYOW-05-SL001-A	NYOW-05-PH001-B	NYOW-05-PH001-C	PH-DUP-001_210112	NYOW-05-SL002-A	SL-DUP-001_210112	NYOW-05-PH002-B	NYOW-05-PH002-C
				Sample Type	N	N	N	FD	N	FD	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	5 - 10	0 - 1	0 - 1	1 - 5	5 - 10
				Date	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**								
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	32 UJ	33 UJ	32 UJ	35 UJ	33 UJ	35 UJ	34 UJ	35 UJ
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	83 U	85 U	84 U	90 U	86 U	91 U	88 U	90 U
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	32 U	33 U	32 U	35 U	33 U	35 U	34 U	35 U
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	50 U	51 U	50 U	54 U	52 U	54 U	53 U	54 U
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	15 U	16 U	16 U	17 U	16 U	17 U	16 U	17 U
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	34 U	36 U	35 U	38 U	36 U	38 U	37 U	38 U
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	6.9 UJ	7.1 UJ	7 UJ	7.5 UJ	7.2 UJ	7.6 UJ	7.3 UJ	7.5 UJ
	PCB-1262	µg/kg	NA		17 U	17 U	17 U	18 U	17 U	18 U	18 U	18 U
	PCB-1268	µg/kg	NA		6.9 U	7.1 U	7 U	7.5 U	7.2 U	7.6 U	7.3 U	7.5 U
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5000**	**6600**	**18000 J**	**8300 J**	**5500**	**6400**	**4900**	**5100**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.12 J**	0.099 U	**0.2 J**	0.11 U	**0.13 J**	**0.1 J**	**0.11 J**	0.078 U
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**4.6**	**3.9**	**4.7 J**	**1.5 J**	**4.5**	**5.6**	**6.4**	**13**
	Barium	mg/kg	330	EPA EcoSSLs	**30**	**68**	**110 J**	**40 J**	**35**	**45**	**29**	**39**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.14 J**	**0.19 J**	**0.73**	**0.32 J**	**0.21 J**	**0.24 J**	**0.19 J**	**0.19 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.072 J**	**0.081 J**	**0.076 J**	**0.062 J**	**0.29**	**0.37**	**0.063 J**	**0.046 J**
	Calcium	mg/kg	NA		**100000**	**29000**	**46000**	**61000**	**9200 J**	**21000 J**	**3500**	**40000**
	Chromium	mg/kg	26	EPA EcoSSLs	**6.4**	**11**	**24 J**	**12 J**	**7.4**	**8.4**	**13 J**	**6.8**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**4.1**	**4.1**	**13 J**	**7.6 J**	**4.5**	**4.9**	**8.3**	**4.8**
	Copper	mg/kg	28	EPA EcoSSLs	**23**	**13**	**21**	**16**	**15**	**21**	**16 J**	**9.6**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**12000**	**13000**	**29000 J**	**16000 J**	**13000**	**16000**	**20000**	**12000**
	Lead	mg/kg	11	EPA EcoSSLs	**4.6**	**5.8**	**9.1**	**6.8**	**9.4**	**9.2**	**4 J**	**2.6**
	Magnesium	mg/kg	NA		**11000**	**4800**	**12000 J**	**23000 J**	**3100 J**	**5600 J**	**3600**	**7100**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**710**	**1000**	**490**	**380**	**440**	**600**	**410**	**360**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.016 J**	**0.054**	*0.017 U*	**0.0078 J**	**0.056**	**0.062**	**0.013 J**	**0.013 J**
	Nickel	mg/kg	38	EPA EcoSSLs	**8.1**	**7.6**	**27**	**17**	**7.7**	**8.8**	**11 J**	**9.5**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.15 J**	**0.28 J**	**0.16 J**	**0.22 J**	**0.45 J**	**0.53**	0.39 U	**0.12 J**
	Silver	mg/kg	4.2	EPA EcoSSLs	0.67 U	0.52 U	0.61 U	0.65 U	0.68 U	0.56 U	2.9 U	0.56 U
	Sodium	mg/kg	NA		**110 J**	**150 J**	**230 J**	**160 J**	110 U	**55 J**	**110 J**	**110 J**
	Thallium	mg/kg	0.05	EPA Region 4 Soil	*0.091 U*	*0.097 U*	**0.16**	*0.1 U*	*0.11 U*	*0.094 U*	*0.097 U*	**0.11**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**10**	**15**	**33 J**	**16 J**	**13**	**15**	**24**	**10**
	Zinc	mg/kg	46	EPA EcoSSLs	**29**	**23**	**50**	**31**	**36**	**34**	**21 J**	**17**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-003			NYOW-05-004			NYOW-05-005		
				Parent Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL004-A	NYOW-05-PH004-B	NYOW-05-PH004-C	NYOW-05-SL005-A	NYOW-05-PH005-B	NYOW-05-PH005-C
				Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL004-A	NYOW-05-PH004-B	NYOW-05-PH004-C	NYOW-05-SL005-A	NYOW-05-PH005-B	NYOW-05-PH005-C
				Sample Type	N	N	N	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**									
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	6.1 U	6 U	---	5.2 U	5.6 U	---	5.6 U	5.6 U
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	3.1 U	3 U	---	2.6 U	2.8 U	---	2.8 U	2.8 U
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	3.1 U	3 U	---	2.6 U	2.8 U	---	2.8 U	2.8 U
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	9.5 U	9.4 U	---	8.1 U	8.7 U	---	8.8 U	8.7 U
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	0.38 U	0.38 U	---	0.32 U	0.35 U	---	0.35 U	0.35 U
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	**8.6 J**	12 U	---	10 U	11 U	---	11 U	11 U
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	12 U	12 U	---	10 U	11 U	---	11 U	11 U
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	12 U	12 U	---	10 U	11 U	---	11 U	11 U
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	69 U	68 U	---	58 U	63 U	---	63 U	63 U
	Benzene	µg/kg	120	EPA Region 4 Soil	---	0.38 U	0.38 U	---	0.32 U	0.35 U	---	0.35 U	0.35 U
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	4.9 U	4.8 U	---	4.1 U	4.4 U	---	4.5 U	4.5 U
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	*3.1 U*	*3 U*	---	*2.6 U*	*2.8 U*	---	*2.8 U*	*2.8 U*
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	6.1 U	6 U	---	5.2 U	5.6 U	---	5.6 U	5.6 U
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	0.38 U	0.38 U	---	0.32 U	0.35 U	---	0.35 U	0.35 U
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	6.1 U	6 U	---	5.2 U	5.6 U	---	5.6 U	5.6 U
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	3.1 U	3 U	---	2.6 U	2.8 U	---	2.8 U	2.8 U
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	7.6 U	7.5 U	---	6.5 U	7 U	---	7 U	7 U
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	6.1 U	6 U	---	5.2 U	5.6 U	---	5.6 U	5.6 U
	Methylcyclohexane	µg/kg	NA		---	1.5 U	1.5 U	---	1.3 U	1.4 U	---	1.4 U	1.4 U
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	3.1 U	3 U	---	2.6 U	2.8 U	---	2.8 U	2.8 U
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	4.8 U	4.7 U	---	4 U	4.4 U	---	4.4 U	4.4 U
	Toluene	µg/kg	150	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	0.76 U	0.75 U	---	0.65 U	0.7 U	---	0.7 U	0.7 U
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	0.19 U	0.19 U	---	0.16 U	0.17 U	---	0.18 U	0.17 U
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	9.5 U	9.4 U	---	8.1 U	8.7 U	---	8.8 U	8.7 U
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	3.1 U	3 U	---	2.6 U	2.8 U	---	2.8 U	2.8 U
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	370 U	420 UJ	410 U	350 U	370 U	390 U	390 U	390 U	380 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	X	X	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*94 U*	*100 U*	*100 U*	*89 U*	*94 U*	*98 U*	*98 U*	*99 U*	*95 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	76 U	85 U	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	2,4,6-Trichlorophenol	µg/kg	NA		76 U	85 U	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*76 U*	*85 U*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*76 U*	*85 U*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	94 U	100 UJ	100 U	89 U	94 U	98 U	98 U	99 U	95 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-003			NYOW-05-004			NYOW-05-005		
				Parent Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL004-A	NYOW-05-PH004-B	NYOW-05-PH004-C	NYOW-05-SL005-A	NYOW-05-PH005-B	NYOW-05-PH005-C
				Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL004-A	NYOW-05-PH004-B	NYOW-05-PH004-C	NYOW-05-SL005-A	NYOW-05-PH005-B	NYOW-05-PH005-C
				Sample Type	N	N	N	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**									
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*76 U*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*76 U*	*85 U*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	76 U	85 U	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*190 U*	*210 UJ*	*210 U*	*180 U*	*190 U*	*200 U*	*200 U*	*200 U*	*190 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	76 U	85 U	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*76 U*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	3-Nitroaniline	µg/kg	NA		94 U	100 UJ	100 U	89 U	94 U	98 U	98 U	99 U	95 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*370 U*	*420 U*	*410 U*	*350 U*	*370 U*	*390 U*	*390 U*	*390 U*	*380 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		76 U	85 UJ	84 UJ	72 UJ	76 UJ	79 UJ	79 UJ	80 UJ	77 UJ
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	76 U	85 U	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	94 U	100 UJ	100 U	89 U	94 U	98 U	98 U	99 U	95 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	94 U	100 UJ	100 U	89 U	94 U	98 U	98 U	99 U	95 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	760 U	850 U	840 U	720 U	760 U	790 U	790 U	800 U	770 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*76 UJ*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	190 U	210 UJ	210 UJ	180 UJ	190 UJ	200 UJ	200 UJ	200 UJ	190 UJ
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*370 U*	*420 UJ*	*410 U*	*350 U*	*370 U*	*390 U*	*390 U*	*390 U*	*380 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	94 UJ	100 UJ	100 U	89 U	94 U	98 U	98 U	99 U	95 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*76 UJ*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	76 UJ	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	190 U	210 UJ	210 U	180 U	190 U	200 U	200 U	200 U	190 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	*76 UJ*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	76 U	*85 U*	*84 U*	72 U	76 U	79 U	79 U	80 U	77 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*76 UJ*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	**390**	*80 U*	*77 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	76 UJ	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	**110 J**	85 UJ	84 U	72 U	76 U	79 U	**210 J**	80 U	77 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	76 UJ	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	76 UJ	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	76 UJ	*85 UJ*	*84 U*	72 U	76 U	79 U	79 U	*80 U*	77 U
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*76 U*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*76 U*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*76 U*	*85 UJ*	*84 U*	*72 U*	*76 U*	*79 U*	*79 U*	*80 U*	*77 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	76 UJ	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	76 U	*85 UJ*	*84 U*	72 U	76 U	*79 U*	*79 U*	*80 U*	77 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	76 U	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	760 U	850 U	840 UJ	720 UJ	760 UJ	790 UJ	790 UJ	800 UJ	770 UJ
	Phenol	µg/kg	790	EPA Region 4 Soil	76 UJ	85 UJ	84 U	72 U	76 U	79 U	79 U	80 U	77 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**65 J+**	**1.3 J**	2.5 U	**69**	2.3 U	2.4 U	**290**	**3.1 J**	2.1 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**87 J+**	**1.7 J**	2.5 U	**90**	2.3 U	2.4 U	**370**	**3.9 J**	2.1 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	1.2 U	1.3 U	1.3 U	1.1 U	1.2 U	1.3 U	12 U	1.3 U	1.1 U
	Acenaphthylene	µg/kg	NA		1.2 U	1.3 U	1.3 U	**3.2 J**	1.2 U	1.3 U	12 U	1.3 U	1.1 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	5 U	5.2 U	5.4 U	**3.2 J**	4.9 U	5.2 U	47 U	5.1 U	4.6 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**6.5 J**	5.2 U	**2.7 J**	**12**	**2.3 J**	5.2 U	**42 J**	5.1 U	**2 J**
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**4.2 J**	5.2 U	**3.1 J**	**12**	4.9 U	5.2 U	**34 J**	5.1 U	**1.7 J**
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**7.6 J**	8 U	**5.5 J**	**19**	7.6 U	**3.7 J**	**58 J**	7.9 U	**3.1 J**
	Benzo[g,h,i]perylene	µg/kg	NA		**3.1 J**	8 U	**2.9 J**	**8.8 J**	7.6 U	8 U	72 U	7.9 U	7.1 U
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**2.3 J**	5.2 U	5.4 U	**6.6 J**	4.9 U	5.2 U	47 U	5.1 U	4.6 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**9.2 J+**	**2.9 J**	**8.3 J**	**25**	**2.8 J**	5.2 U	**56 J**	**4.6 J**	**2.7 J**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	7.7 U	8 U	8.3 U	6.6 U	7.6 U	8 U	72 U	7.9 U	7.1 U
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**9.1 J+**	5.2 U	**2.7 J**	**23**	**7.4 J**	**8.6 J**	**69 J**	5.1 U	**2.5 J**
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**1.4 J**	3.2 U	3.3 U	**1.6 J**	3 U	3.2 U	29 U	3.2 U	2.9 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**2.5 J**	8 U	8.3 U	**8.5 J**	7.6 U	8 U	72 U	7.9 U	7.1 U
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**65 J+**	**2.1 J**	**1.8 J**	**71**	**1.2 J**	2.4 U	**290**	**3.7 J**	**0.89 J**
	Phenanthrene	µg/kg	NA		**34 J+**	8 U	8.3 U	**44**	**3 J**	**6.2 J**	**160**	7.9 U	7.1 U
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**11 J+**	8 U	**4.4 J**	**23**	**6.9 J**	**12**	**68 J**	7.9 U	**2.4 J**

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-003			NYOW-05-004			NYOW-05-005		
				Parent Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL004-A	NYOW-05-PH004-B	NYOW-05-PH004-C	NYOW-05-SL005-A	NYOW-05-PH005-B	NYOW-05-PH005-C
				Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL004-A	NYOW-05-PH004-B	NYOW-05-PH004-C	NYOW-05-SL005-A	NYOW-05-PH005-B	NYOW-05-PH005-C
				Sample Type	N	N	N	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**									
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	35 UJ	40 UJ	36 UJ	33 UJ	34 UJ	37 UJ	34 UJ	36 UJ	35 UJ
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	91 U	100 U	95 U	87 U	88 U	96 U	87 U	93 U	90 U
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	35 U	40 U	36 U	33 U	34 U	37 U	34 U	36 U	35 U
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	55 U	62 U	57 U	52 U	53 U	58 U	52 U	56 U	54 U
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	17 U	19 U	18 U	16 U	16 U	18 U	16 U	17 U	17 U
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	38 U	43 U	39 U	36 U	36 U	40 U	36 U	39 U	38 U
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	7.6 UJ	8.6 UJ	7.9 UJ	7.3 UJ	7.3 UJ	8 UJ	7.3 UJ	7.7 UJ	7.5 UJ
	PCB-1262	µg/kg	NA		18 U	21 U	19 U	17 U	18 U	19 U	17 U	19 U	18 U
	PCB-1268	µg/kg	NA		7.6 U	8.6 U	7.9 U	7.3 U	7.3 U	8 U	7.3 U	7.7 U	7.5 U
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**4400 J**	**19000 J**	**18000**	**4200**	**3200**	**20000**	**3800**	**8600**	**6600**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.18 J**	**0.17 J**	**0.13 J**	**0.076 J**	0.091 U	**0.21**	**1**	**0.12 J**	0.1 U
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**6.8 J+**	**4.5 J**	**5**	**4.3**	**3.6**	**9**	**6.9**	**6.2**	**5.5**
	Barium	mg/kg	330	EPA EcoSSLs	**32**	**110 J**	**110**	**31**	**18**	**140**	**76**	**48**	**50**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.19 J**	**0.77**	**0.77**	**0.1 J**	**0.11 J**	**0.8**	**0.21 J**	**0.37 J**	**0.62 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.15**	**0.073 J**	**0.075 J**	**0.076**	**0.036 J**	**0.074 J**	**4.3**	**0.12**	**0.069 J**
	Calcium	mg/kg	NA		**25000 J**	**43000 J**	**42000**	**95000**	**39000**	**48000**	**13000**	**16000**	**4800**
	Chromium	mg/kg	26	EPA EcoSSLs	**5.5 J-**	**25**	**24**	**5**	**4.9**	**27**	**13**	**11**	**10 J**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**3.6 J-**	**9**	**12**	**6.7**	**2.9**	**15**	**4.3**	**6.1**	**6.4**
	Copper	mg/kg	28	EPA EcoSSLs	**20**	**18**	**21**	**32**	**10**	**25**	**110**	**19**	**17 J**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**11000 J**	**24000 J**	**27000**	**15000**	**9100**	**29000**	**22000**	**18000**	**19000**
	Lead	mg/kg	11	EPA EcoSSLs	**11 J-**	**7.9**	**8.6**	**8.3**	**3.4**	**9.4**	**200**	**6**	**4**
	Magnesium	mg/kg	NA		**4900 J**	**10000 J-**	**10000**	**28000**	**19000**	**12000**	**3000**	**5300**	**4300**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**400 J-**	**450 J**	**490**	**780**	**320**	**730**	**450**	**630**	**440**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.031**	**0.018 J**	**0.015 J**	**0.0078 J**	**0.02**	**0.014 J**	**0.14**	**0.019 J**	**0.018 J**
	Nickel	mg/kg	38	EPA EcoSSLs	**8.3 J-**	**25**	**27**	**9.9**	**5.1**	**32**	**18**	**14**	**14 J**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.27 J**	**0.15 J**	**0.15 J**	**0.13 J**	0.4 U	0.44 U	**0.47**	**0.3 J**	0.41 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.5 U	0.55 U	0.58 U	0.64 U	0.6 U	0.58 U	**0.27 J**	0.58 U	2.5 U
	Sodium	mg/kg	NA		**76 J**	**230 J**	**220 J**	**140 J**	**85 J**	**190 J**	**250 J**	**120 J**	420 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.12**	**0.2 J**	**0.19**	*0.075 U*	*0.1 U*	**0.2**	**0.15**	*0.12 U*	*0.1 U*
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**9.9**	**31**	**34**	**7.9**	**9.7**	**37**	**10**	**16**	**16**
	Zinc	mg/kg	46	EPA EcoSSLs	**35 J-**	**52 J-**	**50**	**28**	**12**	**57**	**690**	**52**	**26 J**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-006			NYOW-05-007			
				Parent Sample ID	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C	NYOW-05-SL007-A	NYOW-05-PH007-B		NYOW-05-PH007-C
				Sample ID	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C	NYOW-05-SL007-A	NYOW-05-PH007-B	PH-DUP-001_210107	NYOW-05-PH007-C
				Sample Type	N	N	N	N	N	FD	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	390 U	370 U	---	360 U	360 U	370 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	---	80 U	75 U	---	73 U	73 U	75 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	---	*99 UJ*	*93 UJ*	---	*91 U*	*90 U*	*93 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	2,4,6-Trichlorophenol	µg/kg	NA		---	80 U	75 U	---	73 U	73 U	75 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	---	99 U	93 U	---	91 U	90 U	93 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-006			NYOW-05-007			
				Parent Sample ID	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C	NYOW-05-SL007-A	NYOW-05-PH007-B		NYOW-05-PH007-C
				Sample ID	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C	NYOW-05-SL007-A	NYOW-05-PH007-B	PH-DUP-001_210107	NYOW-05-PH007-C
				Sample Type	N	N	N	N	N	FD	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	---	80 U	75 U	---	73 U	73 U	75 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	---	*200 U*	*190 U*	---	*190 U*	*180 U*	*190 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	---	80 U	75 U	---	73 U	73 U	75 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 UJ*	*73 UJ*	*75 UJ*
	3-Nitroaniline	µg/kg	NA		---	99 U	93 U	---	91 U	90 U	93 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	---	*390 U*	*370 U*	---	*360 U*	*360 U*	*370 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		---	80 U	75 U	---	73 U	73 U	75 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	---	80 U	75 U	---	73 U	73 U	75 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	---	99 U	93 U	---	91 U	90 U	93 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		---	80 U	75 U	---	73 U	73 U	75 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	---	99 UJ	93 UJ	---	91 U	90 U	93 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	---	800 U	750 U	---	730 U	730 U	750 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	---	80 U	75 U	---	73 U	73 U	75 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	---	*80 UJ*	*75 UJ*	---	*73 UJ*	*73 UJ*	*75 UJ*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	---	200 UJ	190 UJ	---	190 U	180 U	190 U
	Biphenyl	µg/kg	200	EPA Region 4 Soil	---	*390 U*	*370 U*	---	*360 U*	*360 U*	*370 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	---	80 U	75 U	---	73 U	73 U	75 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	99 U	93 U	---	91 U	90 U	93 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 UJ*	*73 UJ*	*75 UJ*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	---	80 UJ	75 UJ	---	73 UJ	73 UJ	75 UJ
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	---	200 UJ	190 UJ	---	190 U	180 U	190 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	---	80 U	75 U	---	73 UJ	73 UJ	75 UJ
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	---	*80 U*	75 U	---	73 UJ	73 UJ	75 UJ
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	---	*80 U*	*75 U*	---	*73 U*	*73 U*	*75 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	---	80 U	75 U	---	73 U	73 U	75 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	---	*80 U*	75 U	---	73 U	73 U	75 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	---	800 U	750 U	---	730 U	730 U	750 U
	Phenol	µg/kg	790	EPA Region 4 Soil	---	80 U	75 U	---	73 U	73 U	75 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**5700**	2.4 U	2.3 U	**10000**	2.2 U	2 UJ	2.3 UJ
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**7700**	2.4 U	**1.5 J**	**14000**	2.2 U	2 UJ	2.3 UJ
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	37 U	1.3 U	1.2 U	**73 J**	1.2 U	1.1 UJ	1.2 UJ
	Acenaphthylene	µg/kg	NA		**110 J**	1.3 U	1.2 U	**180 J**	1.2 U	1.1 UJ	1.2 UJ
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**110 J**	5.2 U	5 U	**290 J**	4.8 U	4.3 UJ	4.9 UJ
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**270 J**	5.2 U	5 U	**750**	4.8 U	4.3 UJ	**2.6 J-**
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**120 J**	5.2 U	5 U	**380**	4.8 U	4.3 UJ	**1.9 J-**
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**190 J**	8 U	7.6 U	**460**	7.4 U	6.7 UJ	**6.5 J-**
	Benzo[g,h,i]perylene	µg/kg	NA		230 U	8 U	7.6 U	**280 J**	7.4 U	6.7 UJ	7.5 UJ
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	150 U	5.2 U	5 U	**120 J**	4.8 U	4.3 UJ	4.9 UJ
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**350**	5.2 U	5 U	**910**	4.8 U	4.3 UJ	**5.7 J-**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	*230 U*	8 U	7.6 U	*220 U*	7.4 U	6.7 UJ	7.5 UJ
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**320 J**	5.2 U	5 U	**660**	4.8 U	4.3 UJ	4.9 UJ
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**96 J**	3.2 U	3 U	**170 J**	2.9 U	2.7 UJ	3 UJ
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	230 U	8 U	7.6 U	**110 J**	7.4 U	6.7 UJ	7.5 UJ
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**5600**	2.4 U	**3.9 J**	**9200**	**0.91 J**	**0.9 J-**	**2.7 J-**
	Phenanthrene	µg/kg	NA		**2300**	8 U	7.6 U	**5300**	7.4 U	6.7 UJ	7.5 UJ
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**450**	8 U	7.6 U	**980**	7.4 U	6.7 UJ	7.5 UJ

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-006			NYOW-05-007			
				Parent Sample ID	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C	NYOW-05-SL007-A	NYOW-05-PH007-B		NYOW-05-PH007-C
				Sample ID	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C	NYOW-05-SL007-A	NYOW-05-PH007-B	PH-DUP-001_210107	NYOW-05-PH007-C
				Sample Type	N	N	N	N	N	FD	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1262	µg/kg	NA		---	---	---	---	---	---	---
	PCB-1268	µg/kg	NA		---	---	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**2500 J+**	**5400 J+**	**5900 J+**	**2600**	**4800**	**4600**	**5900**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.32**	**0.073 J**	0.085 U	**0.24 J**	**0.071 J**	0.086 U	0.1 U
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**24**	**3.9**	**4**	**19**	**2.8**	**2.8**	**3.3**
	Barium	mg/kg	330	EPA EcoSSLs	**34**	**46**	**48**	**43**	**40**	**37**	**43**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.63 J**	**0.21 J**	**0.21 J**	**0.35 J**	**0.19 J**	**0.18 J**	**0.27 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.23**	**0.17**	**0.031 J**	**0.38**	**0.035 J**	**0.023 J**	**0.037 J**
	Calcium	mg/kg	NA		**11000**	**6300**	**54000**	**16000**	**33000**	**25000**	**55000**
	Chromium	mg/kg	26	EPA EcoSSLs	**7.2**	**7.2**	**8.8**	**6**	**6.5**	**6.5**	**9.3**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**6.6**	**4.8**	**6.5**	**4.2**	**3.7**	**4.1**	**6.1**
	Copper	mg/kg	28	EPA EcoSSLs	**22**	**13**	**13**	**22**	**11**	**16**	**13**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**16000**	**16000**	**19000**	**13000**	**9200**	**11000**	**14000**
	Lead	mg/kg	11	EPA EcoSSLs	**21**	**7.2**	**4.6**	**18**	**3**	**3**	**5.3**
	Magnesium	mg/kg	NA		**2700**	**2200**	**15000**	**2900**	**6800**	**5800**	**15000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**320**	**630**	**780**	**270**	**330**	**550**	**400**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.086**	**0.031**	*0.016 U*	**0.093**	*0.017 U*	*0.017 U*	*0.017 U*
	Nickel	mg/kg	38	EPA EcoSSLs	**13**	**8.2**	**13**	**9.2**	**7.8**	**8.7**	**13**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**1**	**0.29 J**	0.32 U	**0.98**	0.39 U	0.36 U	0.36 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.82 U	0.51 U	0.59 U	0.9 U	0.57 U	0.56 U	0.65 U
	Sodium	mg/kg	NA		140 U	86 U	490 U	**100 J**	**95 J**	**78 J**	**120 J**
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.34**	*0.092 U*	*0.08 U*	**0.34**	**0.049 J**	**0.05 J**	**0.085 J**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**12**	**13**	**12**	**10**	**9.5**	**10**	**12**
	Zinc	mg/kg	46	EPA EcoSSLs	**44**	**24**	**23**	**58**	**18**	**19**	**25**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-008			NYOW-05-009			NYOW-05-010		
				Parent Sample ID	NYOW-05-SL008-A	NYOW-05-PH008-B	NYOW-05-PH008-C	NYOW-05-SL009-A	NYOW-05-PH009-B	NYOW-05-PH009-C	NYOW-05-SL010-A	NYOW-05-PH010-B	NYOW-05-PH010-C
				Sample ID	NYOW-05-SL008-A	NYOW-05-PH008-B	NYOW-05-PH008-C	NYOW-05-SL009-A	NYOW-05-PH009-B	NYOW-05-PH009-C	NYOW-05-SL010-A	NYOW-05-PH010-B	NYOW-05-PH010-C
				Sample Type	N	N	N	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**									
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	370 U	370 U	---	360 U	370 U	---	370 U	350 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	---	*93 U*	*92 U*	---	*91 U*	*94 U*	---	*94 U*	*88 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	2,4,6-Trichlorophenol	µg/kg	NA		---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	---	93 U	92 U	---	91 U	94 U	---	94 U	88 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-008			NYOW-05-009			NYOW-05-010		
				Parent Sample ID	NYOW-05-SL008-A	NYOW-05-PH008-B	NYOW-05-PH008-C	NYOW-05-SL009-A	NYOW-05-PH009-B	NYOW-05-PH009-C	NYOW-05-SL010-A	NYOW-05-PH010-B	NYOW-05-PH010-C
				Sample ID	NYOW-05-SL008-A	NYOW-05-PH008-B	NYOW-05-PH008-C	NYOW-05-SL009-A	NYOW-05-PH009-B	NYOW-05-PH009-C	NYOW-05-SL010-A	NYOW-05-PH010-B	NYOW-05-PH010-C
				Sample Type	N	N	N	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**									
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	---	*190 U*	*190 U*	---	*190 U*	*190 U*	---	*190 U*	*180 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	---	*75 UJ*	*74 UJ*	---	*74 UJ*	*76 UJ*	---	*76 UJ*	*71 UJ*
	3-Nitroaniline	µg/kg	NA		---	93 U	92 U	---	91 U	94 U	---	94 U	88 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	---	*370 U*	*370 U*	---	*360 U*	*370 U*	---	*370 U*	*350 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	---	93 U	92 U	---	91 U	94 U	---	94 U	88 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	---	93 U	92 U	---	91 U	94 U	---	94 U	88 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	---	750 U	740 U	---	740 U	760 U	---	760 U	710 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	---	*75 UJ*	*74 UJ*	---	*74 UJ*	*76 UJ*	---	*76 UJ*	*71 UJ*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	---	190 U	190 U	---	190 U	190 U	---	190 U	180 U
	Biphenyl	µg/kg	200	EPA Region 4 Soil	---	*370 U*	*370 U*	---	*360 U*	*370 U*	---	*370 U*	*350 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	93 U	92 U	---	91 U	94 U	---	94 U	88 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	---	*75 UJ*	*74 UJ*	---	*74 UJ*	*76 UJ*	---	*76 UJ*	*71 UJ*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	---	75 UJ	74 UJ	---	74 UJ	76 UJ	---	76 UJ	71 UJ
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	---	190 U	190 U	---	190 U	190 U	---	190 U	180 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	---	75 UJ	74 UJ	---	74 UJ	76 UJ	---	76 UJ	71 UJ
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	---	75 UJ	74 UJ	---	74 UJ	76 UJ	---	76 UJ	71 UJ
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	---	*75 U*	*74 U*	---	*74 U*	*76 U*	---	*76 U*	*71 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	---	750 U	740 U	---	740 U	760 U	---	760 U	710 U
	Phenol	µg/kg	790	EPA Region 4 Soil	---	75 U	74 U	---	74 U	76 U	---	76 U	71 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**6000**	**1.6 J**	**2.5 J**	**120**	2.3 U	2.2 U	**39 J-**	2.1 U	2.1 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**4800**	**1.5 J**	**2.9 J**	**86**	2.3 U	2.2 U	**17**	2.1 U	2.1 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	**100 J**	1.1 U	1.2 U	1.6 U	1.2 U	1.2 U	**6.8 J**	1.1 U	1.1 U
	Acenaphthylene	µg/kg	NA		**180 J**	1.1 U	1.2 U	**14 J**	1.2 U	1.2 U	**5.1 J**	1.1 U	1.1 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**260 J**	4.5 U	4.9 U	6.6 U	4.9 U	4.9 U	5 U	4.5 U	**2 J**
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**610**	4.5 U	4.9 U	**44**	4.9 U	4.9 U	**36**	4.5 U	**19**
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**310 J**	4.5 U	4.9 U	**32**	4.9 U	4.9 U	**14**	4.5 U	**11**
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**430**	6.9 U	7.6 U	**100**	7.6 U	7.5 U	**60 J-**	**2.9 J**	**39**
	Benzo[g,h,i]perylene	µg/kg	NA		**250 J**	6.9 U	7.6 U	**27**	7.6 U	7.5 U	**16**	6.9 U	**11**
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**85 J**	4.5 U	4.9 U	**12 J**	4.9 U	4.9 U	**6.6 J**	4.5 U	**12**
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**1000**	4.5 U	4.9 U	**310**	4.9 U	4.9 U	**180 J-**	4.5 U	**36**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	*230 U*	6.9 U	7.6 U	**18**	7.6 U	7.5 U	**13**	6.9 U	**2.9 J**
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**760**	4.5 U	4.9 U	**100**	4.9 U	4.9 U	**44**	4.5 U	**23**
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**260 J**	2.8 U	3 U	**30**	3 U	3 U	**12**	2.7 U	2.8 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**80 J**	6.9 U	7.6 U	**19**	7.6 U	7.5 U	**6.9 J**	6.9 U	**12**
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**2000**	**1.5 J**	**5.9 J**	**39**	2.3 U	**0.88 J**	**17 J-**	2.1 U	2.1 U
	Phenanthrene	µg/kg	NA		**4200**	6.9 U	7.6 U	**340**	7.6 U	7.5 U	**160 J-**	6.9 U	**6.4 J**
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**990**	6.9 U	7.6 U	**130**	7.6 U	7.5 U	**68 J-**	6.9 U	**23**

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-008			NYOW-05-009			NYOW-05-010		
				Parent Sample ID	NYOW-05-SL008-A	NYOW-05-PH008-B	NYOW-05-PH008-C	NYOW-05-SL009-A	NYOW-05-PH009-B	NYOW-05-PH009-C	NYOW-05-SL010-A	NYOW-05-PH010-B	NYOW-05-PH010-C
				Sample ID	NYOW-05-SL008-A	NYOW-05-PH008-B	NYOW-05-PH008-C	NYOW-05-SL009-A	NYOW-05-PH009-B	NYOW-05-PH009-C	NYOW-05-SL010-A	NYOW-05-PH010-B	NYOW-05-PH010-C
				Sample Type	N	N	N	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**									
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---	---
	PCB-1262	µg/kg	NA		---	---	---	---	---	---	---	---	---
	PCB-1268	µg/kg	NA		---	---	---	---	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**2700**	**6500**	**8200**	**2800**	**3600**	**2000**	**4800 J**	**5600**	**7000**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.46**	**0.087 J**	**0.092 J**	**0.16 J**	0.087 U	0.1 U	0.11 UJ	**0.13 J**	**0.081 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**12**	**4**	**5.8**	**9.7**	**5.1**	**6.2**	**4.5**	**26**	**79**
	Barium	mg/kg	330	EPA EcoSSLs	**37**	**36**	**59**	**45**	**37**	**28**	**65**	**110**	**76**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.39 J**	**0.25 J**	**0.34 J**	**0.33 J**	**0.13 J**	**0.083 J**	**0.27 J**	**0.18 J**	**0.31 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.21**	**0.04 J**	**0.042 J**	**0.19**	**0.038 J**	**0.015 J**	**0.11**	**0.026 J**	**0.018 J**
	Calcium	mg/kg	NA		**5500**	**46000**	**37000**	**4500**	**5000**	**37000**	**2000 J+**	**76000**	**91000**
	Chromium	mg/kg	26	EPA EcoSSLs	**6.6**	**8.9**	**12**	**6**	**5**	**3.8**	**7.2**	**7.3**	**9.8**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**2.1**	**4.9**	**7.4**	**2.4**	**3.5**	**2.7**	**3.4**	**8**	**8.4**
	Copper	mg/kg	28	EPA EcoSSLs	**9.8**	**19**	**16**	**7.4**	**9.3**	**11**	**5.3**	**27**	**15**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**12000**	**14000**	**18000**	**8100**	**9500**	**8500**	**14000**	**25000**	**26000**
	Lead	mg/kg	11	EPA EcoSSLs	**18**	**4.7**	**5.7**	**13**	**3.1**	**2.4**	**4.2**	**4.5**	**4.3**
	Magnesium	mg/kg	NA		**740**	**12000**	**10000**	**930**	**2400**	**7000**	**1100 J**	**8400**	**27000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**110**	**360**	**510**	**330**	**340**	**320**	**400 J-**	**870**	**480**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.19**	*0.015 U*	*0.016 U*	**0.1**	*0.017 U*	*0.018 U*	**0.11**	*0.016 U*	*0.017 U*
	Nickel	mg/kg	38	EPA EcoSSLs	**4.9**	**11**	**16**	**5.4**	**5.5**	**5**	**5.7**	**14**	**16**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**1.5**	0.38 U	0.43 U	**0.64 J**	0.39 U	0.34 U	**0.4 J**	0.38 U	0.38 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.71 U	0.5 U	0.5 U	0.8 U	0.59 U	0.53 U	0.57 U	0.63 U	0.55 U
	Sodium	mg/kg	NA		**37 J**	**120 J**	**140 J**	**70 J**	**46 J**	**64 J**	**37 J**	**100 J**	**150 J**
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.6**	**0.066 J**	**0.086 J**	**0.24**	**0.032 J**	**0.023 J**	**0.18**	**0.077 J**	**0.059 J**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**15**	**13**	**17**	**11**	**8.7**	**5.9**	**15**	**13**	**11**
	Zinc	mg/kg	46	EPA EcoSSLs	**35**	**23**	**29**	**28**	**15**	**11**	**14**	**27**	**21**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-011			NYOW-05-012		
				Parent Sample ID	NYOW-05-SL011-A	NYOW-05-PH011-B	NYOW-05-PH011-C	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C
				Sample ID	NYOW-05-SL011-A	NYOW-05-PH011-B	NYOW-05-PH011-C	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021
Method	Analyte	Units	PAL	PAL Reference						
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	370 U	390 U	370 U	380 U	390 U	380 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	75 U	78 U	75 U	78 U	79 U	76 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*93 UJ*	*97 UJ*	*93 UJ*	*96 UJ*	*97 UJ*	*95 UJ*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	2,4,6-Trichlorophenol	µg/kg	NA		75 U	78 U	75 U	78 U	79 U	76 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	93 U	97 U	93 U	96 U	97 U	95 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-011			NYOW-05-012		
				Parent Sample ID	NYOW-05-SL011-A	NYOW-05-PH011-B	NYOW-05-PH011-C	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C
				Sample ID	NYOW-05-SL011-A	NYOW-05-PH011-B	NYOW-05-PH011-C	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	75 U	78 U	75 U	78 U	79 U	76 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*190 U*	*200 U*	*190 U*	*200 U*	*200 U*	*190 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	75 U	78 U	75 U	78 U	79 U	76 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	3-Nitroaniline	µg/kg	NA		93 U	97 U	93 U	96 U	97 U	95 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*370 U*	*390 U*	*370 U*	*380 U*	*390 U*	*380 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		75 U	78 U	75 U	78 U	79 U	76 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	75 U	78 U	75 U	78 U	79 U	76 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	93 U	97 U	93 U	96 U	97 U	95 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		75 UJ	78 UJ	75 UJ	78 UJ	79 UJ	76 UJ
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	93 U	97 U	93 U	96 U	97 U	95 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	750 U	780 U	750 U	780 U	790 U	760 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	75 U	78 U	75 U	78 U	79 U	76 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	190 UJ	200 UJ	190 UJ	200 UJ	200 UJ	190 UJ
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*370 U*	*390 U*	*370 U*	*380 U*	*390 U*	*380 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	75 U	78 U	75 U	78 U	79 U	76 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	93 U	97 U	93 U	96 U	97 U	95 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	190 U	200 U	190 U	200 U	200 U	190 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	75 UJ	78 UJ	75 UJ	78 UJ	79 UJ	76 UJ
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*75 U*	*78 U*	*75 U*	*78 U*	*79 U*	*76 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	75 U	78 U	75 U	78 U	79 U	76 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	75 U	78 U	75 U	78 U	*79 U*	76 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	750 UJ	780 UJ	750 UJ	780 UJ	790 UJ	760 UJ
	Phenol	µg/kg	790	EPA Region 4 Soil	75 U	78 U	75 U	78 U	79 U	76 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**9.9 J**	2.3 U	2.3 U	**2.3 J**	2.3 U	2.2 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**18**	2.3 U	2.3 U	**3 J**	**1.2 J**	2.2 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	**3.9 J**	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
	Acenaphthylene	µg/kg	NA		**3.2 J**	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**2.6 J**	4.9 U	5.1 U	**2.4 J**	5 U	4.8 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**9.8 J**	4.9 U	**24**	**12**	5 U	4.8 U
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**11 J-**	4.9 UJ	**32 J-**	**13 J-**	5 UJ	4.8 UJ
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**20**	7.6 U	**50**	**23**	7.7 U	7.4 U
	Benzo[g,h,i]perylene	µg/kg	NA		**8.3 J-**	7.6 UJ	**23 J-**	**13 J-**	7.7 UJ	7.4 UJ
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**7.2 J**	4.9 U	**21**	**8.4 J**	5 U	4.8 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**14**	4.9 U	**40**	**17**	**3 J**	**6.7 J**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	7.3 UJ	7.6 UJ	**6.5 J-**	7.7 UJ	7.7 UJ	7.4 UJ
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**20**	**2.6 J**	**41**	**25**	5 U	4.8 U
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**1.6 J**	3 U	3.1 U	3.1 U	3.1 U	3 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**9.6 J-**	7.6 UJ	**29 J-**	**13 J-**	7.7 UJ	7.4 UJ
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**15**	**1.2 J**	**2.3 J**	**5.2 J**	**2.5 J**	**1.3 J**
	Phenanthrene	µg/kg	NA		**9.1 J**	7.6 U	**5.7 J**	**9.4 J**	7.7 U	**2.5 J**
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**19**	**2.6 J**	**39**	**24**	7.7 U	7.4 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-011			NYOW-05-012		
				Parent Sample ID	NYOW-05-SL011-A	NYOW-05-PH011-B	NYOW-05-PH011-C	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C
				Sample ID	NYOW-05-SL011-A	NYOW-05-PH011-B	NYOW-05-PH011-C	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	31 U	---	---	34 U	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	82 U	---	---	87 U	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	31 U	---	---	34 U	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	49 U	---	---	52 U	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	15 U	---	---	16 U	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	34 U	---	---	36 U	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	6.8 U	---	---	**29 J**	---	---
	PCB-1262	µg/kg	NA		16 U	---	---	17 U	---	---
	PCB-1268	µg/kg	NA		6.8 U	---	---	7.3 U	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**8200**	**8900 J**	**15000**	**6500**	**18000**	**17000**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.19**	**0.11 J**	**0.17 J**	**0.17**	**0.15 J**	**0.19 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**5.2**	**4.4**	**8.1**	**5.9**	**5**	**4.1**
	Barium	mg/kg	330	EPA EcoSSLs	**62**	**46**	**98**	**66**	**110**	**110**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.34 J**	**0.43 J**	**0.67**	**0.28 J**	**0.83**	**0.81**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.14**	**0.078 J**	**0.072 J**	**0.14**	**0.061 J**	**0.053 J**
	Calcium	mg/kg	NA		**17000**	**23000 J**	**45000**	**20000**	**47000**	**46000**
	Chromium	mg/kg	26	EPA EcoSSLs	**10**	**14**	**20**	**8.5**	**25**	**24**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**7.1**	**9.7**	**10**	**7**	**13**	**11**
	Copper	mg/kg	28	EPA EcoSSLs	**25**	**21**	**25**	**24**	**25**	**25**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**22000**	**19000 J**	**25000**	**21000**	**27000**	**26000**
	Lead	mg/kg	11	EPA EcoSSLs	**12**	**8.4**	**8.8**	**24**	**9.4**	**9.1**
	Magnesium	mg/kg	NA		**6800**	**8600 J+**	**16000**	**7900**	**12000**	**13000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**1100**	**760**	**470**	**1200**	**600**	**510**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.085**	**0.03**	**0.016 J**	**0.23**	**0.099**	**0.022**
	Nickel	mg/kg	38	EPA EcoSSLs	**15**	**20**	**22**	**12**	**29**	**27**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.3 J**	**0.17 J**	0.44 U	**0.22 J**	**0.12 J**	0.39 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.67 U	0.61 U	0.7 U	0.58 U	0.61 U	0.68 U
	Sodium	mg/kg	NA		110 U	510 U	590 U	97 U	510 U	560 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.12**	*0.099 U*	**0.18**	**0.14**	**0.16**	**0.15**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**16**	**16**	**28**	**15**	**31**	**32**
	Zinc	mg/kg	46	EPA EcoSSLs	**42**	**35**	**50**	**49**	**56**	**55**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-013				NYOW-05-014		
				Parent Sample ID	NYOW-05-SL013-A	NYOW-05-PH013-B	NYOW-05-PH013-C		NYOW-05-SL014-A	NYOW-05-PH014-B	NYOW-05-PH014-C
				Sample ID	NYOW-05-SL013-A	NYOW-05-PH013-B	NYOW-05-PH013-C	PH-DUP-001_210113	NYOW-05-SL014-A	NYOW-05-PH014-B	NYOW-05-PH014-C
				Sample Type	N	N	N	FD	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021
Method	Analyte	Units	PAL	PAL Reference							
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	390 U	350 U	400 U	370 U	380 U	370 U	360 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*98 UJ*	*88 UJ*	*100 UJ*	*94 UJ*	*96 UJ*	*94 UJ*	*91 UJ*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	2,4,6-Trichlorophenol	µg/kg	NA		79 U	71 U	82 U	76 U	78 U	76 U	73 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	98 U	88 U	100 U	94 U	96 U	94 U	91 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-013				NYOW-05-014		
				Parent Sample ID	NYOW-05-SL013-A	NYOW-05-PH013-B	NYOW-05-PH013-C		NYOW-05-SL014-A	NYOW-05-PH014-B	NYOW-05-PH014-C
				Sample ID	NYOW-05-SL013-A	NYOW-05-PH013-B	NYOW-05-PH013-C	PH-DUP-001_210113	NYOW-05-SL014-A	NYOW-05-PH014-B	NYOW-05-PH014-C
				Sample Type	N	N	N	FD	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*200 U*	*180 U*	*210 U*	*190 U*	*200 U*	*190 U*	*190 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	3-Nitroaniline	µg/kg	NA		98 U	88 U	100 U	94 U	96 U	94 U	91 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*390 U*	*350 U*	*400 U*	*370 U*	*380 U*	*370 U*	*360 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		79 U	71 U	82 U	76 U	78 U	76 U	73 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	98 U	88 U	100 U	94 U	96 U	94 U	91 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		79 UJ	71 UJ	82 UJ	76 UJ	78 UJ	76 UJ	73 UJ
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	98 U	88 U	100 U	94 U	96 U	94 U	91 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	790 U	710 U	820 U	760 U	780 U	760 U	730 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	200 UJ	180 UJ	210 UJ	190 UJ	200 UJ	190 UJ	190 UJ
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*390 U*	*350 U*	*400 U*	*370 U*	*380 U*	*370 U*	*360 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	98 U	88 U	100 U	94 U	96 U	94 U	91 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	200 U	180 U	210 U	190 U	200 U	190 U	190 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	79 U	71 U	*82 U*	76 U	78 U	76 U	73 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	79 UJ	71 UJ	*82 UJ*	76 UJ	78 UJ	76 UJ	73 UJ
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*79 U*	*71 U*	*82 U*	*76 U*	*78 U*	*76 U*	*73 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	*79 U*	71 U	*82 U*	76 U	78 U	76 U	73 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	790 UJ	710 UJ	820 UJ	760 UJ	780 UJ	760 UJ	730 UJ
	Phenol	µg/kg	790	EPA Region 4 Soil	79 U	71 U	82 U	76 U	78 U	76 U	73 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**1.4 J**	**3.8 J**	2.4 U	2.1 U	**2.1 J**	2.2 U	2.3 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**1.9 J**	**6.7 J**	2.4 U	2.1 U	**2.9 J**	**0.67 J**	2.3 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	1.2 U	1.1 U	1.3 U	1.1 U	1.1 U	1.2 U	1.2 U
	Acenaphthylene	µg/kg	NA		1.2 U	1.1 U	1.3 U	1.1 U	**4.8 J**	1.2 U	1.2 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**2.6 J**	**3.1 J**	5.2 U	4.6 U	**2.2 J**	4.7 U	4.9 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**12**	**8 J**	5.2 U	4.6 U	**13**	4.7 U	4.9 U
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**12 J-**	**6.7 J-**	5.2 UJ	4.6 UJ	**17 J-**	4.7 UJ	4.9 UJ
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**19**	**15**	8 U	7.1 U	**24**	**3 J**	**3 J**
	Benzo[g,h,i]perylene	µg/kg	NA		**9.8 J-**	**5.8 J-**	8 UJ	7.1 UJ	**12 J-**	7.2 UJ	7.5 UJ
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**7.4 J**	**5.2 J**	5.2 U	4.6 U	**10 J**	4.7 U	4.9 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**15**	**15**	5.2 U	4.6 U	**18**	**2.3 J**	**4.4 J**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	7.8 UJ	6.9 UJ	8 UJ	7.1 UJ	**3.2 J-**	7.2 UJ	7.5 UJ
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**19**	**15**	5.2 U	4.6 U	**22**	4.7 U	4.9 U
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	3.1 U	2.8 U	3.2 U	2.8 U	2.9 U	2.9 U	3 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**11 J-**	**6 J-**	8 UJ	7.1 UJ	**13 J-**	7.2 UJ	7.5 UJ
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**3.3 J**	**7.1 J**	2.4 U	2.1 U	**2.9 J**	**2.3 J**	**2 J**
	Phenanthrene	µg/kg	NA		**8.4 J**	**10**	8 U	7.1 U	**9.9 J**	7.2 U	**2.7 J**
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**17**	**13**	8 U	7.1 U	**20**	7.2 U	**2.5 J**

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-013				NYOW-05-014		
				Parent Sample ID	NYOW-05-SL013-A	NYOW-05-PH013-B	NYOW-05-PH013-C		NYOW-05-SL014-A	NYOW-05-PH014-B	NYOW-05-PH014-C
				Sample ID	NYOW-05-SL013-A	NYOW-05-PH013-B	NYOW-05-PH013-C	PH-DUP-001_210113	NYOW-05-SL014-A	NYOW-05-PH014-B	NYOW-05-PH014-C
				Sample Type	N	N	N	FD	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021	1/13/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	35 U	---	---	---	36 U	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	92 U	---	---	---	94 U	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	35 U	---	---	---	36 U	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	55 U	---	---	---	57 U	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	17 U	---	---	---	18 U	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	38 U	---	---	---	39 U	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	**160**	---	---	---	**13 J**	---	---
	PCB-1262	µg/kg	NA		18 U	---	---	---	19 U	---	---
	PCB-1268	µg/kg	NA		7.7 U	---	---	---	7.9 U	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5500**	**5800**	**10000**	**11000**	**6600**	**10000**	**6600**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.096 J**	**0.17 J**	**0.14 J**	**0.15 J**	**0.13 J**	**0.16 J**	**0.11 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**4.3**	**5.5**	**3.9**	**3.9**	**4.9**	**4.9**	**2.9**
	Barium	mg/kg	330	EPA EcoSSLs	**43**	**51**	**74**	**90**	**51**	**59**	**36**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.26 J**	**0.27 J**	**0.46**	**0.52 J**	**0.34 J**	**0.47 J**	**0.31 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.14**	**0.38**	**0.046 J**	**0.057 J**	**0.11**	**0.054 J**	**0.059 J**
	Calcium	mg/kg	NA		**30000**	**51000**	**59000**	**78000**	**37000**	**82000**	**58000**
	Chromium	mg/kg	26	EPA EcoSSLs	**8.4**	**8.3**	**14**	**17**	**9.6**	**15**	**11**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**6.1**	**5.9**	**9**	**9**	**9.3**	**6.2**	**7.3**
	Copper	mg/kg	28	EPA EcoSSLs	**16**	**74**	**19**	**18**	**21**	**15**	**16**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**17000**	**19000**	**19000**	**20000**	**18000**	**18000**	**15000**
	Lead	mg/kg	11	EPA EcoSSLs	**7.9**	**8.5**	**8.2**	**8.8**	**13**	**7.8**	**6.9**
	Magnesium	mg/kg	NA		**11000**	**14000**	**20000**	**19000**	**12000**	**17000**	**24000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**590**	**870**	**510**	**460**	**660**	**330**	**460**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.029**	**0.035**	**0.014 J**	**0.014 J**	**0.026**	**0.013 J**	**0.011 J**
	Nickel	mg/kg	38	EPA EcoSSLs	**12**	**12**	**20**	**20**	**15**	**16**	**15**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.2 J**	**0.18 J**	0.34 U	0.48 U	**0.17 J**	**0.11 J**	**0.13 J**
	Silver	mg/kg	4.2	EPA EcoSSLs	0.56 U	0.53 U	0.53 U	0.67 U	0.68 U	0.58 U	0.62 U
	Sodium	mg/kg	NA		93 U	88 U	440 U	560 U	570 U	480 U	520 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	*0.12 U*	*0.094 U*	*0.085 U*	*0.12 U*	*0.11 U*	**0.096**	*0.092 U*
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**14**	**13**	**19**	**20**	**14**	**17**	**13**
	Zinc	mg/kg	46	EPA EcoSSLs	**35**	**42**	**39**	**41**	**40**	**35**	**30**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-015			NYOW-05-016		
				Parent Sample ID	NYOW-05-SL015-A	NYOW-05-PH015-B	NYOW-05-PH015-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample ID	NYOW-05-SL015-A	NYOW-05-PH015-B	NYOW-05-PH015-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/14/2021	1/14/2021	1/14/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	380 U	350 U	370 U	390 U	X	380 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	77 U	71 U	76 U	80 U	73 UJ	78 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*95 UJ*	*88 UJ*	*94 UJ*	*99 U*	*91 UJ*	*97 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	2,4,6-Trichlorophenol	µg/kg	NA		77 U	71 U	76 U	80 U	73 UJ	78 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 UJ*	*73 UJ*	*78 UJ*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	95 U	88 U	94 U	99 U	91 UJ	97 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-015			NYOW-05-016		
				Parent Sample ID	NYOW-05-SL015-A	NYOW-05-PH015-B	NYOW-05-PH015-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample ID	NYOW-05-SL015-A	NYOW-05-PH015-B	NYOW-05-PH015-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/14/2021	1/14/2021	1/14/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	77 U	71 U	76 U	80 U	73 UJ	78 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 UJ*	*73 UJ*	*78 UJ*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*200 U*	*180 U*	*190 U*	*200 U*	*190 UJ*	*200 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	77 U	71 U	76 U	80 U	73 UJ	78 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	3-Nitroaniline	µg/kg	NA		95 U	88 U	94 U	99 U	91 UJ	97 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*380 U*	*350 U*	*370 U*	*390 U*	*360 UJ*	*380 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		77 U	71 U	76 U	80 UJ	73 UJ	78 UJ
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	77 U	71 U	76 U	80 UJ	73 UJ	78 UJ
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	95 U	88 U	94 U	99 UJ	91 UJ	97 UJ
	4-Chlorophenyl phenyl ether	µg/kg	NA		77 UJ	71 UJ	76 UJ	80 U	73 UJ	78 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	95 U	88 U	94 U	99 U	91 UJ	97 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	770 U	710 U	760 U	800 U	730 UJ	780 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	77 U	71 U	76 U	80 U	73 UJ	78 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	200 UJ	180 UJ	190 UJ	200 UJ	X	200 UJ
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*380 U*	*350 U*	*370 U*	*390 U*	*360 UJ*	*380 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	77 U	71 U	76 U	80 U	73 UJ	78 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	95 U	88 U	94 U	99 U	91 UJ	97 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	200 U	180 U	190 U	200 U	190 UJ	200 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	77 U	71 U	76 U	80 UJ	73 UJ	78 UJ
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	77 UJ	71 UJ	76 UJ	*80 U*	73 UJ	78 U
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 U*	*73 UJ*	*78 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 UJ*	*73 UJ*	*78 UJ*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*77 U*	*71 U*	*76 U*	*80 UJ*	X	*78 UJ*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	77 U	71 U	76 U	80 U	73 UJ	78 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	77 U	71 U	76 U	*80 U*	73 UJ	78 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	770 UJ	710 UJ	760 UJ	800 U	730 UJ	780 U
	Phenol	µg/kg	790	EPA Region 4 Soil	77 U	71 U	76 U	80 U	73 UJ	78 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**6.1 J**	**0.82 J**	**1.2 J**	**6.7 J**	2.1 U	2.3 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**9.4 J**	**1.6 J**	**2.1 J**	**7.6 J**	2.1 U	2.3 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	**1.7 J**	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U
	Acenaphthylene	µg/kg	NA		**4.6 J**	**0.92 J**	1.2 U	**5.5 J**	1.1 U	1.2 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**7.6 J**	4.5 U	4.7 U	**4.7 J**	4.6 U	4.9 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**18**	**3.5 J**	4.7 U	**31**	4.6 U	4.9 U
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**65 J-**	**3.9 J-**	**1.9 J-**	**29**	4.6 U	4.9 U
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**72**	**8.1 J**	**3.5 J**	**40**	7.1 U	7.6 U
	Benzo[g,h,i]perylene	µg/kg	NA		**49 J-**	**3.5 J-**	7.3 UJ	**20**	7.1 U	7.6 U
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**27**	4.5 U	4.7 U	**16**	4.6 U	4.9 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**26**	**6.6 J**	**3.2 J**	**34**	4.6 U	**4.6 J**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**13 J-**	6.9 UJ	7.3 UJ	**5.3 J**	7.1 U	7.6 U
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**31**	**8.5 J**	**4.3 J**	**56**	4.6 U	4.9 U
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**2.1 J**	2.7 U	2.9 U	3.2 U	2.8 U	3 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**55 J-**	**3.6 J-**	7.3 UJ	**23**	7.1 U	7.6 U
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**7.5 J**	**2.3 J**	**3.3 J**	**5.7 J**	2.1 U	2.3 U
	Phenanthrene	µg/kg	NA		**18**	**4.6 J**	**3.6 J**	**19**	7.1 U	7.6 U
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**29**	**7.1 J**	**3.5 J**	**55**	7.1 U	7.6 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-015			NYOW-05-016		
				Parent Sample ID	NYOW-05-SL015-A	NYOW-05-PH015-B	NYOW-05-PH015-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample ID	NYOW-05-SL015-A	NYOW-05-PH015-B	NYOW-05-PH015-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/14/2021	1/14/2021	1/14/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	36 U	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	93 U	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	36 U	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	56 U	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	18 U	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	39 U	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	**4.2 J**	---	---	---	---	---
	PCB-1262	µg/kg	NA		19 U	---	---	---	---	---
	PCB-1268	µg/kg	NA		7.8 U	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5400**	**7300**	**6600**	**6200**	**9000**	**9100**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.12 J**	**0.14 J**	**0.14 J**	**0.11 J**	**0.083 J**	**0.12 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**4.3**	**4.8**	**8.6**	**25**	**12**	**16**
	Barium	mg/kg	330	EPA EcoSSLs	**48**	**50**	**59**	**53**	**69**	**73**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.27 J**	**0.35 J**	**0.34 J**	**0.26 J**	**0.39 J**	**0.41 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.39**	**0.046 J**	**0.16**	**0.038 J**	**0.025 J**	**0.056 J**
	Calcium	mg/kg	NA		**35000**	**73000**	**49000**	**42000**	**42000**	**52000**
	Chromium	mg/kg	26	EPA EcoSSLs	**7.9**	**10**	**12**	**8.8**	**12**	**13**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**5.6**	**6.3**	**7.1**	**5.8**	**7.8**	**7.9**
	Copper	mg/kg	28	EPA EcoSSLs	**16**	**16**	**18**	**20**	**16**	**20**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**15000**	**16000**	**16000**	**15000**	**20000**	**19000**
	Lead	mg/kg	11	EPA EcoSSLs	**7.6**	**10**	**9**	**7.5**	**5.5**	**6.5**
	Magnesium	mg/kg	NA		**9800**	**26000**	**19000**	**13000**	**14000**	**18000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**630**	**670**	**490**	**630**	**390**	**460**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.026**	**0.024**	**0.026**	**0.033**	*0.015* *U*	*0.017* *U*
	Nickel	mg/kg	38	EPA EcoSSLs	**12**	**13**	**15**	**11**	**16**	**16**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.21 J**	**0.18 J**	**0.16 J**	0.34 U	0.31 U	0.35 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.69 U	0.58 U	0.67 U	0.55 U	0.56 U	0.53 U
	Sodium	mg/kg	NA		110 U	480 U	110 U	**170 J**	**160 J**	**170 J**
	Thallium	mg/kg	0.05	EPA Region 4 Soil	*0.085* *U*	*0.096* *U*	*0.089* *U*	*0.086* *U*	*0.078* *U*	**0.096**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**12**	**14**	**14**	**13**	**18**	**19**
	Zinc	mg/kg	46	EPA EcoSSLs	**33**	**29**	**31**	**31**	**31**	**32**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-017-1					NYOW-05-018		
				Parent Sample ID	NYOW-05-SL017-1-A	SL-DUP-001_210114	NYOW-05-PH017-1-B	PH-DUP-001_210114	NYOW-05-PH017-1-C	NYOW-05-SL018-A	NYOW-05-PH018-B	NYOW-05-PH018-C
				Sample ID	NYOW-05-SL017-1-A	SL-DUP-001_210114	NYOW-05-PH017-1-B	PH-DUP-001_210114	NYOW-05-PH017-1-C	NYOW-05-SL018-A	NYOW-05-PH018-B	NYOW-05-PH018-C
				Sample Type	N	FD	N	FD	N	N	N	N
				Depth (feet)	0 - 1	0 - 1	1 - 5	1 - 5	5 - 10	0 - 1	1 - 5	5 - 6
				Date	1/14/2021	1/14/2021	1/14/2021	1/14/2021	1/14/2021	1/11/2021	1/11/2021	1/11/2021
Method	Analyte	Units	PAL	PAL Reference								
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	360 U	370 U	370 U	380 U	390 U	370 U	360 U	380 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	73 UJ	76 U	75 U	77 U	78 U	74 UJ	73 UJ	77 UJ
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*91 U*	*94 UJ*	*93 UJ*	*95 U*	*97 U*	*92 U*	*91 U*	*95 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	2,4,6-Trichlorophenol	µg/kg	NA		73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 UJ*	*74 U*	*73 U*	*77 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	91 U	94 U	93 U	95 U	97 U	92 U	91 U	95 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-017-1					NYOW-05-018		
				Parent Sample ID	NYOW-05-SL017-1-A	SL-DUP-001_210114	NYOW-05-PH017-1-B	PH-DUP-001_210114	NYOW-05-PH017-1-C	NYOW-05-SL018-A	NYOW-05-PH018-B	NYOW-05-PH018-C
				Sample ID	NYOW-05-SL017-1-A	SL-DUP-001_210114	NYOW-05-PH017-1-B	PH-DUP-001_210114	NYOW-05-PH017-1-C	NYOW-05-SL018-A	NYOW-05-PH018-B	NYOW-05-PH018-C
				Sample Type	N	FD	N	FD	N	N	N	N
				Depth (feet)	0 - 1	0 - 1	1 - 5	1 - 5	5 - 10	0 - 1	1 - 5	5 - 6
				Date	1/14/2021	1/14/2021	1/14/2021	1/14/2021	1/14/2021	1/11/2021	1/11/2021	1/11/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**								
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 UJ*	*74 U*	*73 U*	*77 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*190 U*	*190 U*	*190 U*	*190 U*	*200 U*	*190 U*	*190 U*	*190 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*73 U*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	3-Nitroaniline	µg/kg	NA		91 U	94 U	93 U	95 U	97 U	92 U	91 U	95 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*360 U*	*370 U*	*370 U*	*380 U*	*390 U*	*370 U*	*360 U*	*380 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		73 UJ	76 UJ	75 UJ	77 U	78 UJ	74 U	73 U	77 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	73 UJ	76 U	75 U	77 U	78 UJ	74 U	73 U	77 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	91 UJ	94 U	93 U	95 U	97 UJ	92 U	91 U	95 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	91 U	94 U	93 U	95 U	97 U	92 U	91 U	95 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	730 U	760 U	750 U	770 U	780 U	740 U	730 U	770 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*73 U*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	190 UJ	190 UJ	190 UJ	190 U	200 UJ	190 U	190 U	190 U
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*360 UJ*	*370 U*	*370 U*	*380 U*	*390 U*	*370 U*	*360 U*	*380 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	91 UJ	94 U	93 U	95 U	97 U	92 U	91 U	95 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	190 U	190 U	190 U	190 U	200 U	190 UJ	190 UJ	190 UJ
	Carbazole	µg/kg	70	EPA Region 4 Soil	*73 U*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	73 UJ	76 U	75 U	77 U	78 UJ	74 U	73 U	77 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*73 U*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 UJ	73 UJ	77 UJ
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*73 U*	*76 U*	*75 U*	*77 U*	*78 U*	*74 U*	*73 U*	*77 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 UJ*	*74 U*	*73 U*	*77 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*73 UJ*	*76 U*	*75 U*	*77 U*	*78 UJ*	*74 U*	*73 U*	*77 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	73 UJ	76 U	75 U	77 U	78 U	74 U	73 U	77 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	730 U	760 UJ	750 UJ	770 U	780 U	740 UJ	730 UJ	770 UJ
	Phenol	µg/kg	790	EPA Region 4 Soil	73 U	76 U	75 U	77 U	78 U	74 U	73 U	77 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	2 U	2.2 U	2.2 U	2.2 UJ	2.2 UJ	2.3 UJ	**2.2 J**	**130**
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**1.4 J**	**1.3 J**	2.2 U	2.2 UJ	2.2 UJ	2.3 UJ	**4.4 J**	**160**
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	1.1 U	1.2 U	1.1 U	1.2 UJ	1.2 UJ	1.2 UJ	1.2 U	**4.2 J**
	Acenaphthylene	µg/kg	NA		**3.1 J**	**3.1 J**	1.1 U	1.2 UJ	1.2 UJ	1.2 UJ	1.2 U	**6.3 J**
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**4.6 J**	**4 J**	4.7 U	4.8 UJ	4.8 UJ	5 UJ	4.9 U	**9.7 J**
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**24**	**24**	4.7 U	4.8 UJ	4.8 UJ	**6.7 J-**	**5.3 J**	**42**
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**25**	**22**	4.7 U	4.8 UJ	4.8 UJ	**6.1 J-**	**5 J**	**33**
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**36 J-**	**33**	7.2 U	7.4 UJ	7.4 UJ	**10 J-**	**8.3 J**	**48**
	Benzo[g,h,i]perylene	µg/kg	NA		**19**	**15**	7.2 U	7.4 UJ	7.4 UJ	7.6 UJ	**3.8 J**	**24**
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**13**	**11**	4.7 U	4.8 UJ	4.8 UJ	**3.4 J-**	**2.5 J**	**16**
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**26**	**27**	4.7 U	4.8 UJ	4.8 UJ	**8.5 J-**	**6.6 J**	**60**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**4.6 J**	**3.8 J**	7.2 U	7.4 UJ	7.4 UJ	7.6 UJ	7.5 U	**8 J**
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**45 J-**	**45**	4.7 U	4.8 UJ	4.8 UJ	**13 J-**	**10 J**	**63**
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**2 J**	**1.5 J**	2.9 U	3 UJ	3 UJ	3.1 UJ	3 U	**9.1 J**
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**22**	**17**	7.2 U	7.4 UJ	7.4 UJ	**5 J-**	**4 J**	**24**
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**2.1 J**	**2.2 J**	2.2 U	2.2 UJ	2.2 UJ	2.3 UJ	**2.8 J**	**100**
	Phenanthrene	µg/kg	NA		**19**	**19**	7.2 U	7.4 UJ	7.4 UJ	**5.8 J-**	**4.1 J**	**120**
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**42**	**42**	7.2 U	7.4 UJ	7.4 UJ	**13 J-**	**9.9 J**	**67**

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-017-1					NYOW-05-018		
				Parent Sample ID	NYOW-05-SL017-1-A	SL-DUP-001_210114	NYOW-05-PH017-1-B	PH-DUP-001_210114	NYOW-05-PH017-1-C	NYOW-05-SL018-A	NYOW-05-PH018-B	NYOW-05-PH018-C
				Sample ID	NYOW-05-SL017-1-A	SL-DUP-001_210114	NYOW-05-PH017-1-B	PH-DUP-001_210114	NYOW-05-PH017-1-C	NYOW-05-SL018-A	NYOW-05-PH018-B	NYOW-05-PH018-C
				Sample Type	N	FD	N	FD	N	N	N	N
				Depth (feet)	0 - 1	0 - 1	1 - 5	1 - 5	5 - 10	0 - 1	1 - 5	5 - 6
				Date	1/14/2021	1/14/2021	1/14/2021	1/14/2021	1/14/2021	1/11/2021	1/11/2021	1/11/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**								
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---	---
	PCB-1262	µg/kg	NA		---	---	---	---	---	---	---	---
	PCB-1268	µg/kg	NA		---	---	---	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5300 J**	**5900**	**9700**	**10000**	**11000**	**5200**	**5900**	**8100**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.14 J**	**0.11 J**	**0.13 J**	**0.14 J**	**0.15 J**	**0.13 J**	**0.097 J**	**0.2**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**6.9**	**5.6**	**4.4**	**4.7**	**4.2**	**5.8**	**9.5**	**6.8**
	Barium	mg/kg	330	EPA EcoSSLs	**66 J-**	**46**	**65**	**71**	**96**	**53**	**53**	**53**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.26 J-**	**0.22 J**	**0.41 J**	**0.47 J**	**0.43 J**	**0.22 J**	**0.27 J**	**0.39 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.072 J**	**0.059 J**	**0.07 J**	**0.055 J**	**0.051 J**	**0.09 J**	**0.14**	**0.1**
	Calcium	mg/kg	NA		**18000 J-**	**14000**	**53000**	**54000**	**60000**	**25000**	**30000**	**47000**
	Chromium	mg/kg	26	EPA EcoSSLs	**7.5 J-**	**7.4**	**13**	**14**	**15**	**7.4**	**8.4**	**12**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**5.5 J-**	**6.2**	**7.7**	**8.6**	**8.5**	**5**	**5.5**	**6.7**
	Copper	mg/kg	28	EPA EcoSSLs	**23 J-**	**14**	**17**	**17**	**18**	**16**	**17**	**20**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**19000 J**	**16000**	**17000**	**18000**	**19000**	**15000**	**16000**	**17000**
	Lead	mg/kg	11	EPA EcoSSLs	**8.6 J-**	**6.7**	**7.1**	**7.8**	**7.3**	**7.6**	**7.8**	**13**
	Magnesium	mg/kg	NA		**5800 J-**	**5500**	**15000**	**15000**	**16000**	**9400**	**9200**	**14000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**810**	**610**	**470**	**490**	**590**	**670**	**670**	**520**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	*0.022 U*	*0.021 U*	*0.016 U*	*0.016 U*	*0.017 U*	**0.0075 J**	*0.015 U*	**0.2**
	Nickel	mg/kg	38	EPA EcoSSLs	**10 J-**	**14**	**18**	**18**	**20**	**10**	**11**	**14**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.14 J**	**0.16 J**	0.38 U	0.38 U	**0.15 J**	**0.19 J**	**0.41 J**	**0.28 J**
	Silver	mg/kg	4.2	EPA EcoSSLs	0.6 UJ	0.55 U	0.51 U	0.57 U	0.53 U	0.47 U	0.57 U	0.54 U
	Sodium	mg/kg	NA		**60 J-**	**53 J**	**150 J**	**150 J**	**140 J**	400 U	95 U	450 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	*0.09 U*	**0.1**	**0.12**	**0.13**	*0.083 U*	*0.099 U*	**0.14**	**0.13**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**14 J-**	**12**	**18**	**19**	**19**	**12**	**13**	**15**
	Zinc	mg/kg	46	EPA EcoSSLs	**29 J-**	**27**	**36**	**38**	**38**	**25**	**26**	**83**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-019			NYOW-05-020		
				Parent Sample ID	NYOW-05-SL019-A	NYOW-05-PH019-B	NYOW-05-PH019-C	NYOW-05-SL020-A	NYOW-05-PH020-B	NYOW-05-PH020-C
				Sample ID	NYOW-05-SL019-A	NYOW-05-PH019-B	NYOW-05-PH019-C	NYOW-05-SL020-A	NYOW-05-PH020-B	NYOW-05-PH020-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	350 U	---	370 U	370 U	390 U	380 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	70 UJ	---	76 UJ	74 U	79 U	77 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	*87 U*	---	*94 U*	*92 U*	*98 U*	*96 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	2,4,6-Trichlorophenol	µg/kg	NA		70 U	---	76 U	74 U	79 U	77 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	87 U	---	94 U	92 U	98 U	96 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-019			NYOW-05-020		
				Parent Sample ID	NYOW-05-SL019-A	NYOW-05-PH019-B	NYOW-05-PH019-C	NYOW-05-SL020-A	NYOW-05-PH020-B	NYOW-05-PH020-C
				Sample ID	NYOW-05-SL019-A	NYOW-05-PH019-B	NYOW-05-PH019-C	NYOW-05-SL020-A	NYOW-05-PH020-B	NYOW-05-PH020-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	70 U	---	76 U	74 U	79 U	77 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	*180 U*	---	*190 U*	*190 U*	*200 U*	*200 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	70 U	---	76 U	74 U	79 U	77 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	3-Nitroaniline	µg/kg	NA		87 U	---	94 U	92 U	98 U	96 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	*350 U*	---	*370 U*	*370 U*	*390 U*	*380 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		70 U	---	76 U	74 U	79 U	77 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	70 U	---	76 U	74 U	79 U	77 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	87 U	---	94 U	92 U	98 U	96 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		70 U	---	76 U	74 U	79 U	77 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	87 U	---	94 U	92 U	98 U	96 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	700 U	---	760 U	740 U	790 U	770 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	70 U	---	76 U	74 U	79 U	77 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	180 U	---	190 U	190 U	200 U	200 U
	Biphenyl	µg/kg	200	EPA Region 4 Soil	*350 U*	---	*370 U*	*370 U*	*390 U*	*380 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	70 U	---	76 U	74 U	79 U	77 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	87 U	---	94 U	92 U	98 U	96 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	180 UJ	---	190 UJ	190 U	200 U	200 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	70 U	---	*76 U*	*74 U*	*79 U*	*77 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	70 UJ	---	76 UJ	74 U	79 U	77 U
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	*70 U*	---	*76 U*	*74 U*	*79 U*	*77 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	70 U	---	76 U	74 U	79 U	77 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	70 U	---	76 U	74 U	*79 U*	77 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	700 UJ	---	760 UJ	740 U	790 U	770 U
	Phenol	µg/kg	790	EPA Region 4 Soil	70 U	---	76 U	74 U	79 U	77 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**2.1 J-**	2.2 UJ	2.3 U	2.2 UJ	**2.5 J**	2.1 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**2.5 J-**	2.2 UJ	2.3 U	**1.7 J-**	**3.5 J**	**1.5 J**
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	1.1 UJ	1.2 UJ	1.2 U	1.2 UJ	1.3 U	1.1 U
	Acenaphthylene	µg/kg	NA		1.1 UJ	1.2 UJ	1.2 U	1.2 UJ	1.3 U	1.1 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	4.4 UJ	4.7 UJ	5.1 U	4.8 UJ	**2 J**	4.6 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**10 J-**	4.7 UJ	5.1 U	**7.6 J-**	**8.1 J**	4.6 U
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**10 J-**	4.7 UJ	5.1 U	**7.9 J-**	**6.2 J**	4.6 U
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**16 J-**	**2.7 J-**	7.8 U	**12 J-**	**11 J**	7.1 U
	Benzo[g,h,i]perylene	µg/kg	NA		**7.5 J-**	7.3 UJ	7.8 U	**6.1 J-**	**4.6 J**	7.1 U
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**5.5 J-**	4.7 UJ	5.1 U	**4.4 J-**	**3.7 J**	4.6 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**12 J-**	**2.3 J-**	5.1 U	**9.1 J-**	**15**	**4 J**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	6.8 UJ	7.3 UJ	7.8 U	7.4 UJ	8 U	7.1 U
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**17 J-**	**3.3 J-**	**3.1 J**	**13 J-**	**20**	4.6 U
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	2.7 UJ	2.9 UJ	3.1 U	3 UJ	**2.2 J**	2.8 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**8.5 J-**	7.3 UJ	7.8 U	**6.4 J-**	**4.6 J**	7.1 U
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**2.2 J-**	**0.76 J-**	**1.4 J**	**2.6 J-**	**4.7 J**	**2.9 J**
	Phenanthrene	µg/kg	NA		**6.1 J-**	7.3 UJ	7.8 U	**5.1 J-**	**11 J**	7.1 U
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**16 J-**	**3.1 J-**	**2.7 J**	**12 J-**	**17**	**2.3 J**

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-019			NYOW-05-020		
				Parent Sample ID	NYOW-05-SL019-A	NYOW-05-PH019-B	NYOW-05-PH019-C	NYOW-05-SL020-A	NYOW-05-PH020-B	NYOW-05-PH020-C
				Sample ID	NYOW-05-SL019-A	NYOW-05-PH019-B	NYOW-05-PH019-C	NYOW-05-SL020-A	NYOW-05-PH020-B	NYOW-05-PH020-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---
	PCB-1262	µg/kg	NA		---	---	---	---	---	---
	PCB-1268	µg/kg	NA		---	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5300**	**5100**	**9100**	**5100 J+**	**6300 J+**	**10000 J+**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.11 J**	**0.091 J**	**0.16 J**	**0.09 J**	**0.2 J**	0.11 U
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**5.8**	**6.5**	**40**	**4.8**	**5.1**	**3.7**
	Barium	mg/kg	330	EPA EcoSSLs	**41**	**52**	**48**	**49**	**44**	**130**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.22 J**	**0.21 J**	**0.36 J**	**0.21 J**	**0.27 J**	**0.46**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.086**	**0.039 J**	**0.098**	**0.055 J**	**0.083 J**	**0.056 J**
	Calcium	mg/kg	NA		**19000**	**14000**	**47000**	**22000**	**63000**	**55000**
	Chromium	mg/kg	26	EPA EcoSSLs	**7.2**	**6.8**	**12**	**7.9**	**9.5**	**16**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**4.7**	**5.3**	**7.8**	**5.3**	**6.3**	**7.9**
	Copper	mg/kg	28	EPA EcoSSLs	**14**	**22**	**17**	**20**	**17**	**18**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**14000**	**16000**	**17000**	**15000**	**15000**	**19000**
	Lead	mg/kg	11	EPA EcoSSLs	**6.4**	**6.3**	**7.1**	**7.5**	**28**	**8.1**
	Magnesium	mg/kg	NA		**6100**	**4600**	**17000**	**7700**	**16000**	**14000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**490**	**750**	**460**	**710**	**480**	**450**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.054**	**0.015 J**	**0.045**	**0.014 J**	**0.048**	*0.017 U*
	Nickel	mg/kg	38	EPA EcoSSLs	**9.6**	**11**	**17**	**11**	**14**	**17**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.16 J**	**0.22 J**	**0.2 J**	**0.14 J**	**0.2 J**	0.42 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.51 U	0.47 U	0.49 U	0.49 U	0.51 U	0.55 U
	Sodium	mg/kg	NA		85 U	390 U	410 U	82 U	420 U	460 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	*0.073 U*	*0.099 U*	**0.71**	**0.061 J**	**0.099**	**0.098 J**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**11**	**11**	**16**	**12**	**13**	**18**
	Zinc	mg/kg	46	EPA EcoSSLs	**25**	**22**	**34**	**27**	**150**	**37**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-021			NYOW-05-022			
				Parent Sample ID	NYOW-05-SL021-A	NYOW-05-PH021-B	NYOW-05-PH021-C	NYOW-05-SL022-A	NYOW-05-PH022-B		NYOW-05-PH022-C
				Sample ID	NYOW-05-SL021-A	NYOW-05-PH021-B	NYOW-05-PH021-C	NYOW-05-SL022-A	NYOW-05-PH022-B	PH-DUP-001_210108	NYOW-05-PH022-C
				Sample Type	N	N	N	N	N	FD	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	390 U	390 U	---	370 U	360 U	380 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	---	79 U	79 U	---	75 U	73 U	77 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	---	*98 U*	*98 UJ*	---	*93 U*	*90 U*	*96 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	2,4,6-Trichlorophenol	µg/kg	NA		---	79 U	79 U	---	75 U	73 U	77 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	---	98 U	98 UJ	---	93 U	90 U	96 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-021			NYOW-05-022			
				Parent Sample ID	NYOW-05-SL021-A	NYOW-05-PH021-B	NYOW-05-PH021-C	NYOW-05-SL022-A	NYOW-05-PH022-B		NYOW-05-PH022-C
				Sample ID	NYOW-05-SL021-A	NYOW-05-PH021-B	NYOW-05-PH021-C	NYOW-05-SL022-A	NYOW-05-PH022-B	PH-DUP-001_210108	NYOW-05-PH022-C
				Sample Type	N	N	N	N	N	FD	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	---	79 U	79 U	---	75 U	73 U	77 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	---	*200 U*	*200 U*	---	*190 U*	*180 U*	*200 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	---	79 U	79 U	---	75 U	73 U	77 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	3-Nitroaniline	µg/kg	NA		---	98 U	98 U	---	93 U	90 U	96 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	---	*390 U*	*390 U*	---	*370 U*	*360 U*	*380 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		---	79 U	79 UJ	---	75 U	73 U	77 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	---	79 U	79 U	---	75 U	73 U	77 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	---	98 U	98 U	---	93 U	90 U	96 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		---	79 U	79 U	---	75 U	73 U	77 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	---	98 U	98 UJ	---	93 U	90 U	96 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	---	790 U	790 U	---	750 U	730 U	770 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	---	79 U	79 U	---	75 U	73 U	77 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	---	*79 U*	*79 UJ*	---	*75 U*	*73 U*	*77 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	---	200 U	200 UJ	---	190 U	180 U	200 U
	Biphenyl	µg/kg	200	EPA Region 4 Soil	---	*390 U*	*390 U*	---	*370 U*	*360 U*	*380 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	---	79 U	79 U	---	75 U	73 U	77 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	98 U	98 U	---	93 U	90 U	96 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	---	79 U	79 UJ	---	75 U	73 U	77 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	---	200 U	200 UJ	---	190 U	180 U	200 U
	Carbazole	µg/kg	70	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	---	*79 U*	*79 UJ*	---	*75 U*	*73 U*	*77 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	---	79 U	79 UJ	---	75 U	73 U	77 U
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	---	*79 U*	*79 U*	---	*75 U*	*73 U*	*77 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	---	79 U	79 U	---	75 U	73 U	77 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	---	*79 U*	*79 U*	---	75 U	73 U	77 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	---	790 U	790 U	---	750 U	730 U	770 U
	Phenol	µg/kg	790	EPA Region 4 Soil	---	79 U	79 U	---	75 U	73 U	77 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**1800**	**14**	2.2 UJ	**5.4 J**	2.2 U	2.1 UJ	2.1 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**2500**	**19**	2.2 UJ	**7.1 J**	**1.8 J**	2.1 UJ	2.1 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	13 U	1.2 U	1.2 UJ	1.3 U	1.2 U	1.1 UJ	1.1 U
	Acenaphthylene	µg/kg	NA		**54 J**	**2.4 J**	1.2 UJ	**3.6 J**	**1.9 J**	1.1 UJ	1.1 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**62 J**	**2.3 J**	4.8 UJ	**3.6 J**	4.9 U	4.5 UJ	4.6 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**210**	**11**	4.8 UJ	**19**	**2.8 J**	**2.4 J-**	**3.6 J**
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**120**	**9.6 J**	4.8 UJ	**22**	**3.3 J**	**2.5 J-**	**3.5 J**
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**210**	**20**	7.4 UJ	**34**	**6.3 J**	**4.7 J-**	**6.5 J**
	Benzo[g,h,i]perylene	µg/kg	NA		**130**	**12**	7.4 UJ	**22**	**31 J**	**2.3 J-**	**3.3 J**
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**63 J**	**6 J**	4.8 UJ	**12**	4.9 U	4.5 UJ	**2.3 J**
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**250**	**16**	4.8 UJ	**24**	**4.6 J**	**3.4 J-**	**5.1 J**
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	81 U	7.6 U	7.4 UJ	**4.7 J**	7.5 U	6.9 UJ	7.1 U
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**310**	**19**	4.8 UJ	**34**	**4.6 J**	**3.9 J-**	**4.9 J**
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**31 J**	3 U	3 UJ	**1.3 J**	3 U	2.8 UJ	2.9 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**110 J**	**11**	7.4 UJ	**26**	**13 J**	6.9 UJ	**3.4 J**
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**1800**	**19**	**1.4 J-**	**9 J**	**6.6 J**	**1.1 J-**	**2.7 J**
	Phenanthrene	µg/kg	NA		**980**	**13**	7.4 UJ	**14**	7.5 U	6.9 UJ	7.1 U
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**340**	**18**	7.4 UJ	**31**	**4.3 J**	**3.6 J-**	**4.3 J**

Table J-3
Validated Analytical Results - AOC 5 Soil
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Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-021			NYOW-05-022			
				Parent Sample ID	NYOW-05-SL021-A	NYOW-05-PH021-B	NYOW-05-PH021-C	NYOW-05-SL022-A	NYOW-05-PH022-B		NYOW-05-PH022-C
				Sample ID	NYOW-05-SL021-A	NYOW-05-PH021-B	NYOW-05-PH021-C	NYOW-05-SL022-A	NYOW-05-PH022-B	PH-DUP-001_210108	NYOW-05-PH022-C
				Sample Type	N	N	N	N	N	FD	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1262	µg/kg	NA		---	---	---	---	---	---	---
	PCB-1268	µg/kg	NA		---	---	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5700 J+**	**8800 J+**	**5900 J+**	**8000 J+**	**4600 J+**	**6200 J+**	**7100 J+**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.25**	**0.21**	**0.11 J**	**0.15 J**	**0.1 J**	**0.19**	**0.094 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**10**	**7.4**	**3.3**	**5.4**	**4.9**	**6.7**	**5.8**
	Barium	mg/kg	330	EPA EcoSSLs	**52**	**78**	**75**	**54 J+**	**34**	**47**	**45**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.42 J**	**0.3 J**	**0.22 J**	**0.39 J-**	**0.16 J**	**0.22 J**	**0.33 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.25**	**0.25**	**0.036 J**	**0.15**	**0.16**	**0.12**	**0.1**
	Calcium	mg/kg	NA		**13000**	**5200**	**55000**	**17000 J**	**58000 J**	**29000 J**	**46000**
	Chromium	mg/kg	26	EPA EcoSSLs	**8.3**	**9.9**	**8.5**	**13 J-**	**5.6**	**8.4**	**9.8**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**6.4**	**9**	**6.3**	**7.5 J-**	**4.2**	**5.8**	**7.3**
	Copper	mg/kg	28	EPA EcoSSLs	**20**	**34**	**19**	**22**	**17**	**27**	**17**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**17000**	**31000**	**18000**	**21000 J**	**15000**	**22000**	**16000**
	Lead	mg/kg	11	EPA EcoSSLs	**21**	**18**	**14**	**8.6 J-**	**7.9 J**	**15 J**	**5.8**
	Magnesium	mg/kg	NA		**4000**	**3800**	**28000**	**9000 J**	**6600**	**9100**	**12000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**650**	**2400**	**1100 J**	**660 J**	**730**	**1100**	**490**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.11**	**0.084**	**0.0086 J**	**0.03**	**0.034**	**0.03**	*0.016 U*
	Nickel	mg/kg	38	EPA EcoSSLs	**13**	**14**	**13**	**15**	**7.7**	**11**	**15**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.9**	**0.41 J**	0.34 UJ	**0.22 J**	**0.2 J**	**0.33 J**	**0.22 J**
	Silver	mg/kg	4.2	EPA EcoSSLs	0.78 U	0.53 U	0.73 U	0.61 U	0.46 U	0.61 U	0.55 U
	Sodium	mg/kg	NA		130 U	440 U	610 U	510 UJ	390 U	100 U	460 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.18**	**0.12**	**0.082 J**	*0.11 U*	*0.092 U*	*0.097 U*	*0.092 U*
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**15**	**18**	**16**	**17**	**10**	**14**	**14**
	Zinc	mg/kg	46	EPA EcoSSLs	**55**	**66**	**44 J+**	**36 J-**	**24**	**34**	**28**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-023				NYOW-05-024		
				Parent Sample ID	NYOW-05-SL023-A		NYOW-05-PH023-B	NYOW-05-PH023-C	NYOW-05-SL024-A	NYOW-05-PH024-B	NYOW-05-PH024-C
				Sample ID	NYOW-05-SL023-A	SL-DUP-001_210108	NYOW-05-PH023-B	NYOW-05-PH023-C	NYOW-05-SL024-A	NYOW-05-PH024-B	NYOW-05-PH024-C
				Sample Type	N	FD	N	N	N	N	N
				Depth (feet)	0 - 1	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---	---	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---	---	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---	---	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---	---	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---	---	---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---	---	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---	---	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---	---	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---	---	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---	---	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	370 U	370 U	---	380 U	360 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	---	---	76 U	74 U	---	78 U	73 U
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	---	---	*94 UJ*	*92 UJ*	---	*96 UJ*	*90 UJ*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	2,4,6-Trichlorophenol	µg/kg	NA		---	---	76 U	74 U	---	78 U	73 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	---	---	94 U	92 U	---	96 U	90 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-023				NYOW-05-024		
				Parent Sample ID	NYOW-05-SL023-A		NYOW-05-PH023-B	NYOW-05-PH023-C	NYOW-05-SL024-A	NYOW-05-PH024-B	NYOW-05-PH024-C
				Sample ID	NYOW-05-SL023-A	SL-DUP-001_210108	NYOW-05-PH023-B	NYOW-05-PH023-C	NYOW-05-SL024-A	NYOW-05-PH024-B	NYOW-05-PH024-C
				Sample Type	N	FD	N	N	N	N	N
				Depth (feet)	0 - 1	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	---	---	76 U	74 U	---	78 U	73 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	---	---	*190 U*	*190 U*	---	*200 U*	*180 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	---	---	76 U	74 U	---	78 U	73 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	3-Nitroaniline	µg/kg	NA		---	---	94 U	92 U	---	96 U	90 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	---	---	*370 U*	*370 U*	---	*380 U*	*360 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		---	---	76 U	74 U	---	78 U	73 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	---	---	76 U	74 U	---	78 U	73 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	---	---	94 U	92 U	---	96 U	90 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		---	---	76 U	74 U	---	78 U	73 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	---	---	94 UJ	92 UJ	---	96 UJ	90 UJ
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	---	---	760 U	740 U	---	780 U	730 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	---	---	76 U	74 U	---	78 U	73 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	---	---	*76 UJ*	*74 UJ*	---	*78 UJ*	*73 UJ*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	---	---	190 UJ	190 UJ	---	200 UJ	180 UJ
	Biphenyl	µg/kg	200	EPA Region 4 Soil	---	---	*370 U*	*370 U*	---	*380 U*	*360 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	---	---	76 U	74 U	---	78 U	73 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	94 U	92 U	---	96 U	90 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	---	---	76 UJ	74 UJ	---	78 UJ	73 UJ
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	---	---	190 UJ	190 UJ	---	200 UJ	180 UJ
	Carbazole	µg/kg	70	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	---	---	76 U	74 U	---	**77 J**	73 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	---	---	*76 U*	*74 U*	---	*78 U*	*73 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	---	---	76 U	74 U	---	78 U	73 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	---	---	76 U	74 U	---	78 U	73 U
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	---	---	760 U	740 U	---	780 U	730 U
	Phenol	µg/kg	790	EPA Region 4 Soil	---	---	76 U	74 U	---	78 U	73 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**2500**	**2100**	**8 J**	2.2 U	**7400**	**83 J-**	**2.1 J-**
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**3400**	**3000**	**12**	2.2 U	**10000**	**130 J-**	**3.2 J-**
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	29 U	**65 J-**	1.1 U	1.2 U	56 U	1.3 UJ	1.2 UJ
	Acenaphthylene	µg/kg	NA		**380**	**360 J-**	**3.5 J**	1.2 U	56 U	1.3 UJ	1.2 UJ
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**200 J**	**230 J-**	**5.4 J**	4.8 U	230 U	5.1 UJ	4.8 UJ
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**460**	**320 J-**	**16**	4.8 U	**440 J**	**8.1 J-**	4.8 UJ
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**700**	**880**	**16**	4.8 U	**180 J**	**6 J-**	4.8 UJ
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**1300**	**1500**	**27**	7.3 U	**280 J**	**11 J-**	7.4 UJ
	Benzo[g,h,i]perylene	µg/kg	NA		**4500**	**4900**	**46**	7.3 U	350 U	**5.3 J-**	7.4 UJ
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**410**	**380 J-**	**9.1 J**	4.8 U	230 U	**3 J-**	4.8 UJ
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**1100**	**1100**	**25**	4.8 U	**570**	**11 J-**	4.8 UJ
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**810**	**950**	**7.4 J**	7.3 U	*350 U*	7.8 UJ	7.4 UJ
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**380**	**250 J-**	**30**	4.8 U	**460 J**	**12 J-**	4.8 UJ
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	72 U	**41 J-**	**1.7 J**	2.9 U	**110 J**	**2.4 J-**	3 UJ
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**3300**	**3500**	**35**	7.3 U	350 U	**5.2 J-**	7.4 UJ
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**2500**	**2600**	**20**	**3 J**	**7100**	**110 J-**	**3.8 J-**
	Phenanthrene	µg/kg	NA		**1200**	**1000**	**22**	7.3 U	**3900**	**34 J-**	7.4 UJ
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**490**	**320 J-**	**27**	7.3 U	**730**	**12 J-**	7.4 UJ

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Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-023				NYOW-05-024		
				Parent Sample ID	NYOW-05-SL023-A		NYOW-05-PH023-B	NYOW-05-PH023-C	NYOW-05-SL024-A	NYOW-05-PH024-B	NYOW-05-PH024-C
				Sample ID	NYOW-05-SL023-A	SL-DUP-001_210108	NYOW-05-PH023-B	NYOW-05-PH023-C	NYOW-05-SL024-A	NYOW-05-PH024-B	NYOW-05-PH024-C
				Sample Type	N	FD	N	N	N	N	N
				Depth (feet)	0 - 1	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1262	µg/kg	NA		---	---	---	---	---	---	---
	PCB-1268	µg/kg	NA		---	---	---	---	---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**4400 J+**	**3600 J+**	**6900 J+**	**6900 J+**	**1400 J+**	**6500 J+**	**6100 J+**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.33**	**0.33**	**0.17 J**	**0.11 J**	**0.19 J**	**0.095 J**	**0.091 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**14**	**12**	**6.9**	**3.5**	**16**	**6.3**	**4.1**
	Barium	mg/kg	330	EPA EcoSSLs	**40**	**33**	**51**	**45**	**27**	**48**	**48**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.31 J**	**0.27 J**	**0.3 J**	**0.3 J**	**0.63**	**0.3 J**	**0.26 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.38**	**0.36**	**0.21**	**0.038 J**	**0.11 J**	**0.1**	**0.021 J**
	Calcium	mg/kg	NA		**23000 J**	**120000 J**	**7700**	**36000**	**4400**	**18000**	**42000**
	Chromium	mg/kg	26	EPA EcoSSLs	**8.6**	**7.7**	**7.7**	**10**	**5.8**	**8.6**	**9.2**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**5.2**	**4.6**	**6.3**	**6.4**	**1.8**	**6**	**5.4**
	Copper	mg/kg	28	EPA EcoSSLs	**18**	**16**	**20**	**18**	**10**	**24**	**14**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**12000**	**14000**	**20000**	**16000**	**11000**	**20000**	**14000**
	Lead	mg/kg	11	EPA EcoSSLs	**16**	**17**	**15**	**6.6**	**8.9**	**8.8**	**4.7**
	Magnesium	mg/kg	NA		**5500**	**7500**	**2800**	**11000**	**620**	**5800**	**8700**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**380**	**450**	**910**	**610**	**110**	**820**	**480**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.069**	**0.085**	**0.076**	**0.0077 J**	**0.064**	**0.033**	*0.017 U*
	Nickel	mg/kg	38	EPA EcoSSLs	**12**	**11**	**10**	**14**	**6.1**	**11**	**11**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.73**	**0.57 J**	**0.4 J**	0.45 U	**0.83**	**0.26 J**	0.35 U
	Silver	mg/kg	4.2	EPA EcoSSLs	0.79 U	0.63 U	0.56 U	0.59 U	0.72 U	0.65 U	0.48 U
	Sodium	mg/kg	NA		130 U	520 U	94 U	500 U	600 U	540 U	400 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.25**	**0.22**	*0.11 U*	*0.11 U*	**0.26**	*0.087 U*	*0.088 U*
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**11**	**10**	**15**	**13**	**7.6**	**14**	**12**
	Zinc	mg/kg	46	EPA EcoSSLs	**62**	**45**	**37**	**29**	**16**	**30**	**22**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-025		
				Parent Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample Type	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**			
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/kg	40	EPA Region 4 Soil	---	---	---
	1,1,2,2-Tetrachloroethane	µg/kg	127	EPA Region 4 Soil	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	670000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	1,1,2-Trichloroethane	µg/kg	150	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	1,1-Dichloroethane	µg/kg	140	EPA Region 4 Soil	---	---	---
	1,1-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---
	1,2,3-Trichlorobenzene	µg/kg	6300	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	1,2,4-Trichlorobenzene	µg/kg	270	EPA Region 4 Soil	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/kg	NA		---	---	---
	1,2-Dibromoethane (EDB)	µg/kg	36	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	1,2-Dichlorobenzene	µg/kg	90	EPA Region 4 Soil	---	---	---
	1,2-Dichloroethane	µg/kg	400	EPA Region 4 Soil	---	---	---
	1,2-Dichloropropane	µg/kg	280	EPA Region 4 Soil	---	---	---
	1,3-Dichlorobenzene	µg/kg	80	EPA Region 4 Soil	---	---	---
	1,3-Dichloropropane	µg/kg	160000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	1,4-Dichlorobenzene	µg/kg	880	EPA Region 4 Soil	---	---	---
	2-Butanone (MEK)	µg/kg	1000	EPA Region 4 Soil	---	---	---
	2-Hexanone	µg/kg	360	EPA Region 4 Soil	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/kg	443000	EPA Region 5 RCRA SO ESLs	---	---	---
	Acetone	µg/kg	1200	EPA Region 4 Soil	---	---	---
	Benzene	µg/kg	120	EPA Region 4 Soil	---	---	---
	Bromochloromethane	µg/kg	15000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Bromodichloromethane	µg/kg	290	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Bromoform	µg/kg	70	EPA Region 4 Soil	---	---	---
	Bromomethane	µg/kg	2	EPA Region 4 Soil	---	---	---
	Carbon disulfide	µg/kg	5	EPA Region 4 Soil	---	---	---
	Carbon tetrachloride	µg/kg	50	EPA Region 4 Soil	---	---	---
	Chlorobenzene	µg/kg	2400	EPA Region 4 Soil	---	---	---
	Chloroethane	µg/kg	1400000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Chloroform	µg/kg	50	EPA Region 4 Soil	---	---	---
	Chloromethane	µg/kg	10400	EPA Region 5 RCRA SO ESLs	---	---	---
	cis-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---
	cis-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---
	Cyclohexane	µg/kg	650000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Dibromochloromethane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	---	---
	Dichlorodifluoromethane	µg/kg	8700	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Ethylbenzene	µg/kg	270	EPA Region 4 Soil	---	---	---
	Isopropylbenzene	µg/kg	40	EPA Region 4 Soil	---	---	---
	m,p-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---
	Methyl acetate	µg/kg	7800000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Methyl tert-butyl ether	µg/kg	47000	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	Methylcyclohexane	µg/kg	NA		---	---	---
	Methylene Chloride	µg/kg	210	EPA Region 4 Soil	---	---	---
	o-Xylene	µg/kg	100	EPA Region 4 Soil	---	---	---
	Styrene	µg/kg	1200	EPA Region 4 Soil	---	---	---
	Tetrachloroethene	µg/kg	60	EPA Region 4 Soil	---	---	---
	Toluene	µg/kg	150	EPA Region 4 Soil	---	---	---
	trans-1,2-Dichloroethene	µg/kg	40	EPA Region 4 Soil	---	---	---
	trans-1,3-Dichloropropene	µg/kg	1	EPA Region 4 Soil	---	---	---
	Trichlorofluoromethane	µg/kg	16400	EPA Region 4 Soil	---	---	---
	Vinyl chloride	µg/kg	30	EPA Region 4 Soil	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/kg	180	EPA Region 4 Soil	---	76 U	79 U
	1,4-Dioxane	µg/kg	2050	EPA Region 5 RCRA SO ESLs	---	380 U	390 U
	2,2'-oxybis[1-chloropropane]	µg/kg	19900	EPA Region 5 RCRA SO ESLs	---	76 UJ	79 UJ
	2,3,4,6-Tetrachlorophenol	µg/kg	40	EPA Region 4 Soil	---	*94 U*	*98 U*
	2,4,5-Trichlorophenol	µg/kg	4000	EPA Region 4 Soil	---	76 U	79 U
	2,4,6-Trichlorophenol	µg/kg	NA		---	76 U	79 U
	2,4-Dichlorophenol	µg/kg	50	EPA Region 4 Soil	---	*76 U*	*79 U*
	2,4-Dimethylphenol	µg/kg	40	EPA Region 4 Soil	---	*76 U*	*79 U*
	2,4-Dinitrotoluene	µg/kg	1700	2021 May EPA Resident Soil (THQ 0.1)	---	94 U	98 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-025		
				Parent Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample Type	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**			
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/kg	360	2021 May EPA Resident Soil (THQ 0.1)	---	76 U	79 U
	2-Chloronaphthalene	µg/kg	12.2	EPA Region 5 RCRA SO ESLs	---	*76 U*	*79 U*
	2-Chlorophenol	µg/kg	60	EPA Region 4 Soil	---	*76 U*	*79 U*
	2-Methylphenol	µg/kg	100	EPA Region 4 Soil	---	76 U	79 U
	2-Nitroaniline	µg/kg	20	EPA Region 4 Soil	---	*190 U*	*200 U*
	2-Nitrophenol	µg/kg	1600	EPA Region 5 RCRA SO ESLs	---	76 U	79 U
	3,3'-Dichlorobenzidine	µg/kg	30	EPA Region 4 Soil	---	*76 U*	*79 U*
	3-Nitroaniline	µg/kg	NA		---	94 U	98 U
	4,6-Dinitro-2-methylphenol	µg/kg	144	EPA Region 5 RCRA SO ESLs	---	*380 U*	*390 U*
	4-Bromophenyl phenyl ether	µg/kg	NA		---	76 U	79 U
	4-Chloro-3-methylphenol	µg/kg	7950	EPA Region 5 RCRA SO ESLs	---	76 U	79 U
	4-Chloroaniline	µg/kg	1000	EPA Region 4 Soil	---	94 U	98 U
	4-Chlorophenyl phenyl ether	µg/kg	NA		---	76 U	79 U
	4-Nitroaniline	µg/kg	21900	EPA Region 5 RCRA SO ESLs	---	94 U	98 U
	4-Nitrophenol	µg/kg	5120	EPA Region 4 Soil	---	760 U	790 U
	Acetophenone	µg/kg	300000	EPA Region 5 RCRA SO ESLs	---	76 U	79 U
	Atrazine	µg/kg	0.05	EPA Region 4 Soil	---	*76 U*	*79 U*
	Benzaldehyde	µg/kg	170000	2021 May EPA Resident Soil (THQ 0.1)	---	190 U	200 U
	Biphenyl	µg/kg	200	EPA Region 4 Soil	---	*380 U*	*390 U*
	Bis(2-chloroethoxy)methane	µg/kg	302	EPA Region 5 RCRA SO ESLs	---	76 U	79 U
	Bis(2-chloroethyl)ether	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	94 U	98 U
	Bis(2-ethylhexyl) phthalate	µg/kg	20	EPA Region 4 Soil	---	*76 U*	*79 U*
	Butyl benzyl phthalate	µg/kg	590	EPA Region 4 Soil	---	76 U	79 U
	Caprolactam	µg/kg	3100000	2021 May EPA Resident Soil (THQ 0.1)	---	190 UJ	200 UJ
	Carbazole	µg/kg	70	EPA Region 4 Soil	---	*76 U*	*79 U*
	Cresols, m- & p-	µg/kg	80	EPA Region 4 Soil	---	76 U	79 U
	Di-n-butyl phthalate	µg/kg	11	EPA Region 4 Soil	---	*76 U*	*79 U*
	Di-n-octyl phthalate	µg/kg	910	EPA Region 4 Soil	---	76 U	79 U
	Dibenzofuran	µg/kg	150	EPA Region 4 Soil	---	76 U	79 U
	Diethyl phthalate	µg/kg	250	EPA Region 4 Soil	---	76 U	79 U
	Dimethyl phthalate	µg/kg	350	EPA Region 4 Soil	---	76 U	79 U
	Hexachlorobenzene	µg/kg	79	EPA Region 4 Soil	---	76 UJ	79 UJ
	Hexachlorobutadiene	µg/kg	9	EPA Region 4 Soil	---	*76 U*	*79 U*
	Hexachlorocyclopentadiene	µg/kg	1	EPA Region 4 Soil	---	*76 U*	*79 U*
	Hexachloroethane	µg/kg	24	EPA Region 4 Soil	---	*76 U*	*79 U*
	Isophorone	µg/kg	139000	EPA Region 5 RCRA SO ESLs	---	76 U	79 U
	N-Nitrosodi-n-propylamine	µg/kg	78	2021 May EPA Resident Soil (THQ 0.1)	---	76 U	*79 U*
	N-Nitrosodiphenylamine	µg/kg	545	EPA Region 4 Soil	---	76 U	79 U
	Nitrobenzene	µg/kg	2200	EPA Region 4 Soil	---	76 U	79 U
	Pentachlorophenol	µg/kg	1000	2021 May EPA Resident Soil (THQ 0.1)	---	760 UJ	790 UJ
	Phenol	µg/kg	790	EPA Region 4 Soil	---	76 U	79 U
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/kg	18000	2021 May EPA Resident Soil (THQ 0.1)	**77**	**2.2 J**	2.3 U
	2-Methylnaphthalene	µg/kg	24000	2021 May EPA Resident Soil (THQ 0.1)	**89**	**2.8 J**	2.3 U
	Acenaphthene	µg/kg	360000	2021 May EPA Resident Soil (THQ 0.1)	1.3 U	1.3 U	1.3 U
	Acenaphthylene	µg/kg	NA		**8.1 J**	1.3 U	1.3 U
	Anthracene	µg/kg	1800000	2021 May EPA Resident Soil (THQ 0.1)	**4.8 J**	5.2 U	5.1 U
	Benzo[a]anthracene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**19 J+**	**2.5 J**	5.1 U
	Benzo[a]pyrene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**23**	**3.2 J**	5.1 U
	Benzo[b]fluoranthene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**59**	**6.7 J**	7.8 U
	Benzo[g,h,i]perylene	µg/kg	NA		**65**	**11 J**	7.8 U
	Benzo[k]fluoranthene	µg/kg	11000	2021 May EPA Resident Soil (THQ 0.1)	**14**	5.2 U	5.1 U
	Chrysene	µg/kg	110000	2021 May EPA Resident Soil (THQ 0.1)	**40 J+**	**6.2 J**	5.1 U
	Dibenz(a,h)anthracene	µg/kg	110	2021 May EPA Resident Soil (THQ 0.1)	**12**	7.9 U	7.8 U
	Fluoranthene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**29 J+**	**4.8 J**	5.1 U
	Fluorene	µg/kg	240000	2021 May EPA Resident Soil (THQ 0.1)	**2.1 J**	3.2 U	3.1 U
	Indeno[1,2,3-cd]pyrene	µg/kg	1100	2021 May EPA Resident Soil (THQ 0.1)	**50**	**10 J**	7.8 U
	Naphthalene	µg/kg	2000	2021 May EPA Resident Soil (THQ 0.1)	**63**	**2.7 J**	2.3 U
	Phenanthrene	µg/kg	NA		**57**	**4.1 J**	7.8 U
	Pyrene	µg/kg	180000	2021 May EPA Resident Soil (THQ 0.1)	**29 J+**	**4.1 J**	7.8 U

Table J-3
Validated Analytical Results - AOC 5 Soil
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-025		
				Parent Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample Type	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**			
PCBs (SW8082A)	PCB-1016	µg/kg	410	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1221	µg/kg	200	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1232	µg/kg	170	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1242	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1248	µg/kg	230	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1254	µg/kg	120	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1260	µg/kg	240	2021 May EPA Resident Soil (THQ 0.1)	---	---	---
	PCB-1262	µg/kg	NA		---	---	---
	PCB-1268	µg/kg	NA		---	---	---
TAL Metals (SW6010C/SW6020A/ SW7471B)	Aluminum	mg/kg	7700	2021 May EPA Resident Soil (THQ 0.1)	**5600**	**9000**	**9000**
	Antimony	mg/kg	0.27	EPA EcoSSLs	**0.16 J**	**0.16 J**	**0.13 J**
	Arsenic	mg/kg	0.68	2021 May EPA Resident Soil (THQ 0.1)	**4.6**	**5.4**	**9.7**
	Barium	mg/kg	330	EPA EcoSSLs	**34**	**66**	**61**
	Beryllium	mg/kg	16	2021 May EPA Resident Soil (THQ 0.1)	**0.28 J-**	**0.63 J**	**0.37 J**
	Cadmium	mg/kg	0.36	EPA EcoSSLs	**0.1 J**	**0.11**	**0.086 J**
	Calcium	mg/kg	NA		**26000**	**18000**	**53000**
	Chromium	mg/kg	26	EPA EcoSSLs	**8.6 J-**	**11**	**13**
	Cobalt	mg/kg	2.3	2021 May EPA Resident Soil (THQ 0.1)	**5.2 J-**	**7.6**	**7.5**
	Copper	mg/kg	28	EPA EcoSSLs	**14**	**21**	**18**
	Iron	mg/kg	5500	2021 May EPA Resident Soil (THQ 0.1)	**14000**	**24000**	**20000**
	Lead	mg/kg	11	EPA EcoSSLs	**8.9 J-**	**11**	**7.3**
	Magnesium	mg/kg	NA		**11000 J-**	**4400**	**18000**
	Manganese	mg/kg	180	2021 May EPA Resident Soil (THQ 0.1)	**410 J**	**1100**	**480**
	Mercury	mg/kg	0.013	EPA Region 4 Soil	**0.026**	**0.051**	**0.0089 J**
	Nickel	mg/kg	38	EPA EcoSSLs	**11 J-**	**14**	**17**
	Selenium	mg/kg	0.52	EPA EcoSSLs	**0.31 J**	**0.24 J**	**0.23 J**
	Silver	mg/kg	4.2	EPA EcoSSLs	0.68 UJ	0.55 U	0.49 U
	Sodium	mg/kg	NA		110 U	460 U	410 U
	Thallium	mg/kg	0.05	EPA Region 4 Soil	**0.12**	**0.11**	**0.1**
	Vanadium	mg/kg	7.8	EPA EcoSSLs	**13**	**17**	**17**
	Zinc	mg/kg	46	EPA EcoSSLs	**34 J-**	**36**	**33**

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

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"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
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PH - direct push sample
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Resident Soil (THQ 0.1) - Environmental Protection Agency May 2021 Resident Soil Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
EPA EcoSSLs - Environmental Protection Agency (various dates) Ecological Soil Screening Levels
EPA Region 4 Soil - EPA Region 4 Ecological Risk Assessment Supplemental Guidance – Soil Screening Values for Hazardous Waste Sites (2018)
EPA Region 5 RCRA Soil ESLs - EPA Region 5 Resource Conservation and Recovery Act Soil Ecological Screening Levels (2003)

Table J-4
Validated Analytical Results - AOC 5 Background Parameters
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

					Location ID	NYOW-05-003			NYOW-05-006		
					Parent Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C
					Sample ID	NYOW-05-SL003-A	NYOW-05-PH003-B	NYOW-05-PH003-C	NYOW-05-SL006-A	NYOW-05-PH006-B	NYOW-05-PH006-C
					Sample Type	N	N	N	N	N	N
					Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
					Date	1/12/2021	1/12/2021	1/12/2021	1/8/2021	1/8/2021	1/8/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
TOC (SW9060A)	Total Organic Carbon	mg/kg	NA			**6600 J-**	**2900 J-**	**2300 J-**	**380000 J-**	**9600 J-**	2000 UJ
CEC (9081)	Cation Exchange Capacity	meq/100gm	NA			**12**	**25**	**16**	**69**	**8.4**	**4.1**
Grain Size (D422)	Gravel	%	NA			**41.9**	**0.0**	**1.8**	**15.2**	**7.6**	**14.3**
	Coarse Sand	%	NA			**10.5**	**0.7**	**5.8**	**7.4**	**4.4**	**7.7**
	Medium Sand	%	NA			**10.1**	**3.9**	**16.1**	**26.0**	**8.1**	**8.7**
	Fine Sand	%	NA			**24.6**	**28.1**	**37.1**	**35.7**	**60.9**	**32.0**
	Silt	%	NA			**10.5**	**39.5**	**23.5**	**8.2**	**10.5**	**29.0**
	Clay	%	NA			**2.4**	**27.8**	**15.7**	**7.5**	**8.5**	**8.3**

Note: NYOW-05-012 broke in transit on the way to Seattle and the sample was not salvageable.

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
meq/100gm - milliequivalents per 100 grams
mg/kg - milligram per kilogram
% - percent

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.

Table J-4
Validated Analytical Results - AOC 5 Background Parameters
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-012			NYOW-05-016		
				Parent Sample ID	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample ID	NYOW-05-SL012-A	NYOW-05-PH012-B	NYOW-05-PH012-C	NYOW-05-SL016-A	NYOW-05-PH016-B	NYOW-05-PH016-C
				Sample Type	N	N	N	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10	0 - 1	1 - 5	5 - 10
				Date	1/13/2021	1/13/2021	1/13/2021	1/14/2021	1/14/2021	1/14/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**						
TOC (SW9060A)	Total Organic Carbon	mg/kg	NA		**15000 J-**	**1900 J-**	**2700 J-**	**6400 J-**	**960 J-**	**1600 J-**
CEC (9081)	Cation Exchange Capacity	meq/100gm	NA		**17**	**12**	**15**	**9.4**	**11**	**8.4**
Grain Size (D422)	Gravel	%	NA		**31.8**	---	**0.0**	**38.0**	**3.9**	**0.0**
	Coarse Sand	%	NA		**4.6**	---	**0.0**	**5.9**	**2.9**	**0.1**
	Medium Sand	%	NA		**9.5**	---	**0.6**	**5.9**	**4.5**	**1.2**
	Fine Sand	%	NA		**28.7**	---	**8.8**	**21.9**	**21.1**	**6.1**
	Silt	%	NA		**16.1**	---	**40.8**	**16.8**	**47.6**	**50.0**
	Clay	%	NA		**9.3**	---	**49.8**	**11.5**	**20.0**	**42.6**

Note: NYOW-05-012 broke in transit on the way to Seattle and the sample was not salvageable.

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
meq/100gm - milliequivalents per 100 grams
mg/kg - milligram per kilogram
% - percent

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be b

Table J-4
Validated Analytical Results - AOC 5 Background Parameters
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-025		
				Parent Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample ID	NYOW-05-SL025-A	NYOW-05-PH025-B	NYOW-05-PH025-C
				Sample Type	N	N	N
				Depth (feet)	0 - 1	1 - 5	5 - 10
				Date	1/11/2021	1/11/2021	1/11/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**			
TOC (SW9060A)	Total Organic Carbon	mg/kg	NA		**28000 J-**	**7800 J-**	**1100 J-**
CEC (9081)	Cation Exchange Capacity	meq/100gm	NA		**24**	**7**	**12**
Grain Size (D422)	Gravel	%	NA		**4.1**	**17.6**	**0.4**
	Coarse Sand	%	NA		**3.4**	**6.9**	**0.7**
	Medium Sand	%	NA		**4.4**	**10.3**	**0.8**
	Fine Sand	%	NA		**33.0**	**30.0**	**11.9**
	Silt	%	NA		**44.9**	**23.4**	**70.0**
	Clay	%	NA		**10.2**	**11.7**	**16.2**

Note: NYOW-05-012 broke in transit on the way to Seattle and the sample was not salvageable.

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Abbreviations and Symbols

"---" - Not requested
"-A", "-B", "-C" in sample ID indicates soil sample depth: A (0 - 1 ft), B (1 - 5 ft), and C (5 - 10 ft)
FD - field duplicate sample
N - normal sample
NA - not applicable
SL - surface sample
PH - direct push sample
meq/100gm - milliequivalents per 100 grams
mg/kg - milligram per kilogram
% - percent

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be b

Table J-5
Validated Analytical Results - AOC 5 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-001	NYOW-05-004		NYOW-05-005	NYOW-05-006	NYOW-05-008	NYOW-05-010
				Parent Sample ID	NYOW-05-WL001-A	NYOW-05-WL004-A		NYOW-05-WL005-A	NYOW-05-WL006-A	NYOW-05-WL008-A	NYOW-05-WL010-A
				Sample ID	NYOW-05-WL001-A	NYOW-05-WL004-A	WL-DUP-001_210114	NYOW-05-WL005-A	NYOW-05-WL006-A	NYOW-05-WL008-A	NYOW-05-WL010-A
				Sample Type	N	N	FD	N	N	N	N
				Depth (feet)	11 - 21	12 - 22	12 - 22	11 - 21	13 - 23	9 - 19	10.38 - 20.38
				Date	1/13/2021	1/14/2021	1/14/2021	1/14/2021	1/11/2021	1/11/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/L	800	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	1,1,2,2-Tetrachloroethane	µg/L	0.076	2021 May EPA Tapwater (THQ 0.1)	*0.8 U*	*0.8 U*	*0.8 U*	*0.8 U*	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	1000	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	1,1,2-Trichloroethane	µg/L	0.041	2021 May EPA Tapwater (THQ 0.1)	*0.8 U*	*0.8 U*	*0.8 U*	*0.8 U*	---	---	---
	1,1-Dichloroethane	µg/L	2.8	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	1,1-Dichloroethene	µg/L	28	2021 May EPA Tapwater (THQ 0.1)	0.8 UJ	0.8 U	0.8 U	0.8 U	---	---	---
	1,2,3-Trichlorobenzene	µg/L	0.7	2021 May EPA Tapwater (THQ 0.1)	*0.8 U*	**0.45 J**	*0.8 U*	*0.8 U*	---	---	---
	1,2,4-Trichlorobenzene	µg/L	0.4	2021 May EPA Tapwater (THQ 0.1)	*0.8 U*	*0.8 U*	*0.8 U*	*0.8 U*	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/L	NA		1.6 UJ	1.6 U	1.6 U	1.6 U	---	---	---
	1,2-Dibromoethane (EDB)	µg/L	0.0075	2021 May EPA Tapwater (THQ 0.1)	*0.4 U*	*0.4 U*	*0.4 U*	*0.4 U*	---	---	---
	1,2-Dichlorobenzene	µg/L	30	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	1,2-Dichloroethane	µg/L	0.17	2021 May EPA Tapwater (THQ 0.1)	*0.4 U*	*0.4 U*	*0.4 U*	*0.4 U*	---	---	---
	1,2-Dichloropropane	µg/L	0.82	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	1,3-Dichlorobenzene	µg/L	3	New York State Groundwater 703.5	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	1,3-Dichloropropane	µg/L	37	2021 May EPA Tapwater (THQ 0.1)	0.2 U	0.2 U	0.2 U	0.2 U	---	---	---
	1,4-Dichlorobenzene	µg/L	0.48	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	2-Butanone (MEK)	µg/L	560	2021 May EPA Tapwater (THQ 0.1)	4 U	4 U	4 U	4 U	---	---	---
	2-Hexanone	µg/L	3.8	2021 May EPA Tapwater (THQ 0.1)	*4 U*	*4 U*	*4 U*	*4 U*	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/L	630	2021 May EPA Tapwater (THQ 0.1)	3.2 U	3.2 U	3.2 U	3.2 U	---	---	---
	Acetone	µg/L	1400	2021 May EPA Tapwater (THQ 0.1)	6.4 U	6.4 U	6.4 U	6.4 U	---	---	---
	Benzene	µg/L	0.46	2021 May EPA Tapwater (THQ 0.1)	0.4 U	0.4 U	0.4 U	0.4 U	---	---	---
	Bromochloromethane	µg/L	8.3	2021 May EPA Tapwater (THQ 0.1)	0.2 U	0.2 U	0.2 U	0.2 U	---	---	---
	Bromodichloromethane	µg/L	0.13	2021 May EPA Tapwater (THQ 0.1)	*0.4 UJ*	*0.4 U*	*0.4 U*	*0.4 U*	---	---	---
	Bromoform	µg/L	3.3	2021 May EPA Tapwater (THQ 0.1)	1 UJ	1 U	1 U	1 U	---	---	---
	Bromomethane	µg/L	0.75	2021 May EPA Tapwater (THQ 0.1)	*0.8 UJ*	*0.8 UJ*	*0.8 UJ*	*0.8 UJ*	---	---	---
	Carbon disulfide	µg/L	81	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	Carbon tetrachloride	µg/L	0.46	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Chlorobenzene	µg/L	7.8	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Chloroethane	µg/L	2100	2021 May EPA Tapwater (THQ 0.1)	1.6 U	1.6 U	1.6 U	1.6 U	---	---	---
	Chloroform	µg/L	0.22	2021 May EPA Tapwater (THQ 0.1)	*0.4 U*	*0.4 U*	*0.4 U*	*0.4 U*	---	---	---
	Chloromethane	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	cis-1,2-Dichloroethene	µg/L	3.6	2021 May EPA Tapwater (THQ 0.1)	0.4 U	0.4 U	0.4 U	0.4 U	---	---	---
	cis-1,3-Dichloropropene	µg/L	NA		0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Cyclohexane	µg/L	1300	2021 May EPA Tapwater (THQ 0.1)	0.8 UJ	0.8 U	0.8 U	0.8 U	---	---	---
	Dibromochloromethane	µg/L	0.87	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Dichlorodifluoromethane	µg/L	20	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	Ethylbenzene	µg/L	1.5	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Isopropylbenzene	µg/L	45	2021 May EPA Tapwater (THQ 0.1)	0.4 U	0.4 U	0.4 U	0.4 U	---	---	---
	m,p-Xylene	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	0.8 UJ	0.8 U	0.8 U	0.8 U	---	---	---
	Methyl acetate	µg/L	2000	2021 May EPA Tapwater (THQ 0.1)	4 U	4 U	4 U	4 U	---	---	---
	Methyl tert-butyl ether	µg/L	14	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	Methylcyclohexane	µg/L	NA		0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Methylene Chloride	µg/L	11	2021 May EPA Tapwater (THQ 0.1)	2 U	2 U	2 U	2 U	---	---	---
	o-Xylene	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	0.4 U	0.4 U	0.4 U	0.4 U	---	---	---
	Styrene	µg/L	120	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	Tetrachloroethene	µg/L	4.1	2021 May EPA Tapwater (THQ 0.1)	0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Toluene	µg/L	110	2021 May EPA Tapwater (THQ 0.1)	0.4 U	0.4 U	0.4 U	0.4 U	---	---	---
	trans-1,2-Dichloroethene	µg/L	6.8	2021 May EPA Tapwater (THQ 0.1)	0.4 U	0.4 U	0.4 U	0.4 U	---	---	---
	trans-1,3-Dichloropropene	µg/L	NA		0.4 UJ	0.4 U	0.4 U	0.4 U	---	---	---
	Trichlorofluoromethane	µg/L	520	2021 May EPA Tapwater (THQ 0.1)	0.8 U	0.8 U	0.8 U	0.8 U	---	---	---
	Vinyl chloride	µg/L	0.019	2021 May EPA Tapwater (THQ 0.1)	*0.2 U*	*0.2 U*	*0.2 U*	*0.2 U*	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/L	0.17	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	1,4-Dioxane	µg/L	0.46	2021 May EPA Tapwater (THQ 0.1)	*10 UJ*	*10 UJ*	*10 UJ*	*10 UJ*	*10 UJ*	*12 UJ*	X
	2,2'-oxybis[1-chloropropane]	µg/L	71	2021 May EPA Tapwater (THQ 0.1)	X	2.1 UJ	2.1 UJ	2.1 UJ	X	X	X
	2,3,4,6-Tetrachlorophenol	µg/L	24	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 U	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	2,4,5-Trichlorophenol	µg/L	120	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 UJ	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	2,4,6-Trichlorophenol	µg/L	NA		2 U	2.1 UJ	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	2,4-Dichlorophenol	µg/L	4.6	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 UJ	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	2,4-Dimethylphenol	µg/L	36	2021 May EPA Tapwater (THQ 0.1)	10 U	10 U	10 U	10 U	10 U	12 U	10 U
	2,4-Dinitrotoluene	µg/L	0.24	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X

Table J-5
Validated Analytical Results - AOC 5 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-001	NYOW-05-004		NYOW-05-005	NYOW-05-006	NYOW-05-008	NYOW-05-010
				Parent Sample ID	NYOW-05-WL001-A	NYOW-05-WL004-A		NYOW-05-WL005-A	NYOW-05-WL006-A	NYOW-05-WL008-A	NYOW-05-WL010-A
				Sample ID	NYOW-05-WL001-A	NYOW-05-WL004-A	WL-DUP-001_210114	NYOW-05-WL005-A	NYOW-05-WL006-A	NYOW-05-WL008-A	NYOW-05-WL010-A
				Sample Type	N	N	FD	N	N	N	N
				Depth (feet)	11 - 21	12 - 22	12 - 22	11 - 21	13 - 23	9 - 19	10.38 - 20.38
				Date	1/13/2021	1/14/2021	1/14/2021	1/14/2021	1/11/2021	1/11/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/L	0.049	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	2-Chloronaphthalene	µg/L	75	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	2-Chlorophenol	µg/L	9.1	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 U	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	2-Methylphenol	µg/L	93	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 U	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	2-Nitroaniline	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	2-Nitrophenol	µg/L	NA		2 U	2.1 UJ	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	3,3'-Dichlorobenzidine	µg/L	0.13	2021 May EPA Tapwater (THQ 0.1)	*61 UJ*	*63 UJ*	*62 UJ*	*62 UJ*	*61 UJ*	*71 UJ*	X
	3-Nitroaniline	µg/L	5	New York State Groundwater 703.5	*10 UJ*	*10 UJ*	*10 UJ*	*10 UJ*	*10 UJ*	*12 UJ*	X
	4,6-Dinitro-2-methylphenol	µg/L	0.15	2021 May EPA Tapwater (THQ 0.1)	*20 U*	*21 U*	*21 U*	*21 U*	*20 U*	*24 U*	*21 U*
	4-Bromophenyl phenyl ether	µg/L	NA		2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	4-Chloro-3-methylphenol	µg/L	140	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 UJ	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	4-Chloroaniline	µg/L	0.37	2021 May EPA Tapwater (THQ 0.1)	*5 UJ*	*5.2 UJ*	*5.2 UJ*	*5.1 UJ*	*5.1 UJ*	*5.9 UJ*	X
	4-Chlorophenyl phenyl ether	µg/L	NA		2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	4-Nitroaniline	µg/L	3.8	2021 May EPA Tapwater (THQ 0.1)	*10 UJ*	*10 UJ*	*10 UJ*	*10 UJ*	*10 UJ*	*12 UJ*	X
	4-Nitrophenol	µg/L	NA		4 U	4.2 U	4.1 U	4.1 U	4.1 U	4.7 U	4.2 U
	Acetophenone	µg/L	190	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Atrazine	µg/L	0.3	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Benzaldehyde	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Biphenyl	µg/L	0.083	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Bis(2-chloroethoxy)methane	µg/L	5.9	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Bis(2-chloroethyl)ether	µg/L	0.014	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Bis(2-ethylhexyl) phthalate	µg/L	5.6	2021 May EPA Tapwater (THQ 0.1)	2.5 UJ	2.6 UJ	2.6 UJ	2.6 UJ	2.5 UJ	3 UJ	X
	Butyl benzyl phthalate	µg/L	16	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Caprolactam	µg/L	990	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Carbazole	µg/L	NA		2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Cresols, m- & p-	µg/L	93	2021 May EPA Tapwater (THQ 0.1)	2 U	2.1 U	2.1 U	2.1 U	2 U	2.4 U	2.1 U
	Di-n-butyl phthalate	µg/L	90	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Di-n-octyl phthalate	µg/L	20	2021 May EPA Tapwater (THQ 0.1)	2.5 UJ	2.6 UJ	2.6 UJ	2.6 UJ	2.5 UJ	3 UJ	X
	Dibenzofuran	µg/L	0.79	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Diethyl phthalate	µg/L	1500	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Dimethyl phthalate	µg/L	NA		2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Hexachlorobenzene	µg/L	0.0098	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Hexachlorobutadiene	µg/L	0.14	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Hexachlorocyclopentadiene	µg/L	0.041	2021 May EPA Tapwater (THQ 0.1)	*5 UJ*	*5.2 UJ*	*5.2 UJ*	*5.1 UJ*	*5.1 UJ*	*5.9 UJ*	X
	Hexachloroethane	µg/L	0.33	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Isophorone	µg/L	78	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	N-Nitrosodi-n-propylamine	µg/L	0.011	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	N-Nitrosodiphenylamine	µg/L	12	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.4 UJ	X
	Nitrobenzene	µg/L	0.14	2021 May EPA Tapwater (THQ 0.1)	*2 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	*2.4 UJ*	X
	Pentachlorophenol	µg/L	0.041	2021 May EPA Tapwater (THQ 0.1)	*4 UJ*	*4.2 UJ*	*4.1 UJ*	*4.1 UJ*	*4.1 UJ*	*4.7 UJ*	*4.2 UJ*
	Phenol	µg/L	580	2021 May EPA Tapwater (THQ 0.1)	2 UJ	2.1 U	2.1 U	2.1 U	2 UJ	2.4 UJ	2.1 UJ
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/L	1.1	2021 May EPA Tapwater (THQ 0.1)	0.044 U	0.039 U	0.043 U	0.041 U	0.047 UJ	0.048 U	**0.21 J-**
	2-Methylnaphthalene	µg/L	3.6	2021 May EPA Tapwater (THQ 0.1)	0.055 U	0.049 U	**0.085 J**	0.051 U	0.058 UJ	0.06 U	**0.22 J-**
	Acenaphthene	µg/L	53	2021 May EPA Tapwater (THQ 0.1)	0.013 U	0.012 U	0.013 U	0.012 U	0.014 UJ	0.014 U	0.012 UJ
	Acenaphthylene	µg/L	NA		0.022 U	0.02 U	0.022 U	0.021 U	0.023 UJ	0.024 U	0.021 UJ
	Anthracene	µg/L	180	2021 May EPA Tapwater (THQ 0.1)	0.11 U	0.098 U	0.11 U	0.1 U	0.12 UJ	0.12 U	0.1 UJ
	Benzo[a]anthracene	µg/L	0.03	2021 May EPA Tapwater (THQ 0.1)	*0.11 U*	*0.098 U*	*0.11 U*	*0.1 U*	*0.12 UJ*	*0.12 U*	*0.1 UJ*
	Benzo[a]pyrene	µg/L	0.025	2021 May EPA Tapwater (THQ 0.1)	*0.055 UJ*	*0.049 U*	*0.054 U*	*0.051 U*	*0.058 UJ*	*0.06 UJ*	*0.051 UJ*
	Benzo[b]fluoranthene	µg/L	0.25	2021 May EPA Tapwater (THQ 0.1)	0.11 U	0.098 U	0.11 U	**0.079 J**	0.12 UJ	0.12 UJ	0.1 UJ
	Benzo[g,h,i]perylene	µg/L	NA		0.11 UJ	0.098 U	0.11 U	0.1 U	0.12 UJ	0.12 UJ	0.1 UJ
	Benzo[k]fluoranthene	µg/L	2.5	2021 May EPA Tapwater (THQ 0.1)	0.055 U	0.049 U	0.054 U	**0.03 J**	0.058 UJ	0.06 UJ	0.051 UJ
	Chrysene	µg/L	25	2021 May EPA Tapwater (THQ 0.1)	0.11 U	0.098 U	0.11 U	**0.065 J**	0.12 UJ	0.12 U	0.1 UJ
	Dibenz(a,h)anthracene	µg/L	0.025	2021 May EPA Tapwater (THQ 0.1)	*0.11 UJ*	*0.098 UJ*	*0.11 UJ*	*0.1 UJ*	*0.12 UJ*	*0.12 UJ*	*0.1 UJ*
	Fluoranthene	µg/L	80	2021 May EPA Tapwater (THQ 0.1)	0.11 U	0.098 U	0.11 U	**0.081 J**	0.12 UJ	0.12 U	0.1 UJ
	Fluorene	µg/L	29	2021 May EPA Tapwater (THQ 0.1)	0.044 U	0.039 U	0.043 U	0.041 U	0.047 UJ	0.048 U	0.041 UJ
	Indeno[1,2,3-cd]pyrene	µg/L	0.25	2021 May EPA Tapwater (THQ 0.1)	0.11 UJ	0.098 U	0.11 U	0.1 U	0.12 UJ	0.12 UJ	0.1 UJ
	Naphthalene	µg/L	0.12	2021 May EPA Tapwater (THQ 0.1)	0.055 U	**0.11 J+**	**0.19 J+**	**0.14 J+**	**0.039 J-**	0.06 U	**0.17 J-**
	Phenanthrene	µg/L	NA		0.11 U	0.098 U	0.11 U	**0.057 J**	0.12 UJ	0.12 U	**0.28 J-**
	Pyrene	µg/L	12	2021 May EPA Tapwater (THQ 0.1)	0.11 U	0.098 U	0.11 U	**0.072 J**	0.12 UJ	0.12 U	0.1 UJ

Table J-5
Validated Analytical Results - AOC 5 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-001	NYOW-05-004		NYOW-05-005	NYOW-05-006	NYOW-05-008	NYOW-05-010
				Parent Sample ID	NYOW-05-WL001-A	NYOW-05-WL004-A		NYOW-05-WL005-A	NYOW-05-WL006-A	NYOW-05-WL008-A	NYOW-05-WL010-A
				Sample ID	NYOW-05-WL001-A	NYOW-05-WL004-A	WL-DUP-001_210114	NYOW-05-WL005-A	NYOW-05-WL006-A	NYOW-05-WL008-A	NYOW-05-WL010-A
				Sample Type	N	N	FD	N	N	N	N
				Depth (feet)	11 - 21	12 - 22	12 - 22	11 - 21	13 - 23	9 - 19	10.38 - 20.38
				Date	1/13/2021	1/14/2021	1/14/2021	1/14/2021	1/11/2021	1/11/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
PCBs (SW8082A)	PCB-1016	µg/L	0.14	2021 May EPA Tapwater (THQ 0.1)	*0.54 UJ*	*0.43 UJ*	*0.42 UJ*	*0.41 UJ*	---	---	---
	PCB-1221	µg/L	0.0047	2021 May EPA Tapwater (THQ 0.1)	*0.34 U*	*0.27 U*	*0.26 U*	*0.26 U*	---	---	---
	PCB-1232	µg/L	0.0047	2021 May EPA Tapwater (THQ 0.1)	*0.81 U*	*0.64 U*	*0.63 U*	*0.62 U*	---	---	---
	PCB-1242	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	*1.3 U*	*1.1 U*	*1.1 U*	*1 U*	---	---	---
	PCB-1248	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	*0.4 U*	*0.32 U*	*0.32 U*	*0.31 U*	---	---	---
	PCB-1254	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	*0.34 U*	*0.27 U*	*0.26 U*	*0.26 U*	---	---	---
	PCB-1260	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	*0.54 UJ*	*0.43 UJ*	*0.42 UJ*	*0.41 UJ*	---	---	---
	PCB-1262	µg/L	NA		0.67 U	0.53 U	0.53 U	0.51 U	---	---	---
	PCB-1268	µg/L	NA		1.3 U	1.1 U	1.1 U	1 U	---	---	---
TAL Metals, Dissolved (SW6010C/SW6020A/ SW7470A)	Aluminum	µg/L	2000	2021 May EPA Tapwater (THQ 0.1)	**44 J**	70 U	70 U	70 U	70 U	70 U	70 U
	Antimony	µg/L	0.78	2021 May EPA Tapwater (THQ 0.1)	*6 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.94 J+**
	Arsenic	µg/L	0.052	2021 May EPA Tapwater (THQ 0.1)	**2 J**	**6.4**	**5.5**	**0.53 J**	**1.6 J**	**0.9 J**	**7.1**
	Barium	µg/L	380	2021 May EPA Tapwater (THQ 0.1)	**42**	**110**	**110**	**130**	**140**	**38**	**160**
	Beryllium	µg/L	2.5	2021 May EPA Tapwater (THQ 0.1)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Cadmium	µg/L	0.92	2021 May EPA Tapwater (THQ 0.1)	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*
	Calcium	µg/L	NA		**34000**	**51000**	**52000**	**100000**	**83000**	**140000**	**48000**
	Chromium	µg/L	2200	2021 May EPA Tapwater (THQ 0.1)	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	Cobalt	µg/L	0.6	2021 May EPA Tapwater (THQ 0.1)	**0.17 J**	**0.64 J**	**0.57 J**	**1**	**0.84 J**	**1.1**	**0.69 J**
	Copper	µg/L	80	2021 May EPA Tapwater (THQ 0.1)	10 U	10 U	10 U	10 U	10 U	10 U	10 U
	Iron	µg/L	1400	2021 May EPA Tapwater (THQ 0.1)	85 U	**1200**	**1300**	**940**	**2500**	**3400**	**750**
	Lead	µg/L	15	2021 May EPA Tapwater (THQ 0.1)	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
	Magnesium	µg/L	NA		**14000**	**38000**	**38000**	**32000**	**56000**	**33000**	**22000**
	Manganese	µg/L	43	2021 May EPA Tapwater (THQ 0.1)	**120**	**490**	**510**	**2600**	**440**	**290**	**220**
	Mercury	µg/L	0.063	2021 May EPA Tapwater (THQ 0.1)	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*
	Nickel	µg/L	39	2021 May EPA Tapwater (THQ 0.1)	8 U	**3.5 J**	8 U	8 U	8 U	8 U	**3.2 J**
	Selenium	µg/L	10	2021 May EPA Tapwater (THQ 0.1)	*19 U*	*19 U*	*19 U*	*19 U*	*19 U*	*19 U*	*19 U*
	Silver	µg/L	9.4	2021 May EPA Tapwater (THQ 0.1)	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Sodium	µg/L	20000	New York State Groundwater 703.5	**25000**	**15000**	**16000**	**100000**	**38000**	**18000**	**20000**
	Thallium	µg/L	0.02	2021 May EPA Tapwater (THQ 0.1)	*1 U*	*1 U*	*0.2 U*	*0.2 U*	*0.2 U*	*0.2 U*	*0.2 U*
	Vanadium	µg/L	8.6	2021 May EPA Tapwater (THQ 0.1)	4 U	4 U	4 U	4 U	4 U	4 U	4 U
	Zinc	µg/L	600	2021 May EPA Tapwater (THQ 0.1)	15 U	15 U	15 U	15 U	15 U	15 U	15 U

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested
"-A" in sample ID indicates shallow water-bearing zone.
FD - field duplicate sample
N - normal sample
NA - not applicable
WL - temporary well groundwater sample
µg/L - micrograms per liter

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.
J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.
J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.
U - Non-detect at Limit of Detection (LOD).
UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.
X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Tapwater (THQ 0.1) - Environmental Protection Agency May 2021 Tapwater Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)
New York State Groundwater 703.5 - New York State Department of Environmental Conservation (NYSDEC; 6 NYCRR Part 703-5, 2019):
Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations – Groundwater standards

Table J-5
Validated Analytical Results - AOC 5 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-012		NYOW-05-016	NYOW-05-017-1	NYOW-05-019	NYOW-05-024	NYOW-05-025
				Parent Sample ID	NYOW-05-WL012-A		NYOW-05-WL016-A	NYOW-05-WL017-1-A	NYOW-05-WL019-A	NYOW-05-WL024-A	NYOW-05-WL025-A
				Sample ID	NYOW-05-WL012-A	WL-DUP-002_210114	NYOW-05-WL016-A	NYOW-05-WL017-1-A	NYOW-05-WL019-A	NYOW-05-WL024-A	NYOW-05-WL025-A
				Sample Type	N	FD	N	N	N	N	N
				Depth (feet)	16.5 - 26.5	16.5 - 26.5	18 - 28	18.5 - 28.5	9 - 19	11.17 - 21.17	12 - 22
				Date	1/14/2021	1/14/2021	1/15/2021	1/15/2021	1/15/2021	1/11/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
VOCs (SW8260C)	1,1,1-Trichloroethane	µg/L	800	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2,2-Tetrachloroethane	µg/L	0.076	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	1000	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,1,2-Trichloroethane	µg/L	0.041	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,1-Dichloroethane	µg/L	2.8	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,1-Dichloroethene	µg/L	28	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,2,3-Trichlorobenzene	µg/L	0.7	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,2,4-Trichlorobenzene	µg/L	0.4	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dibromo-3-Chloropropane	µg/L	NA		---	---	---	---	---	---	---
	1,2-Dibromoethane (EDB)	µg/L	0.0075	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichlorobenzene	µg/L	30	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichloroethane	µg/L	0.17	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,2-Dichloropropane	µg/L	0.82	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,3-Dichlorobenzene	µg/L	3	New York State Groundwater 703.5	---	---	---	---	---	---	---
	1,3-Dichloropropane	µg/L	37	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	1,4-Dichlorobenzene	µg/L	0.48	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	2-Butanone (MEK)	µg/L	560	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	2-Hexanone	µg/L	3.8	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	µg/L	630	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Acetone	µg/L	1400	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Benzene	µg/L	0.46	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Bromochloromethane	µg/L	8.3	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Bromodichloromethane	µg/L	0.13	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Bromoform	µg/L	3.3	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Bromomethane	µg/L	0.75	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Carbon disulfide	µg/L	81	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Carbon tetrachloride	µg/L	0.46	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Chlorobenzene	µg/L	7.8	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Chloroethane	µg/L	2100	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Chloroform	µg/L	0.22	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Chloromethane	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	cis-1,2-Dichloroethene	µg/L	3.6	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	cis-1,3-Dichloropropene	µg/L	NA		---	---	---	---	---	---	---
	Cyclohexane	µg/L	1300	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Dibromochloromethane	µg/L	0.87	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Dichlorodifluoromethane	µg/L	20	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Ethylbenzene	µg/L	1.5	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Isopropylbenzene	µg/L	45	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	m,p-Xylene	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Methyl acetate	µg/L	2000	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Methyl tert-butyl ether	µg/L	14	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Methylcyclohexane	µg/L	NA		---	---	---	---	---	---	---
	Methylene Chloride	µg/L	11	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	o-Xylene	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Styrene	µg/L	120	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Tetrachloroethene	µg/L	4.1	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Toluene	µg/L	110	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	trans-1,2-Dichloroethene	µg/L	6.8	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	trans-1,3-Dichloropropene	µg/L	NA		---	---	---	---	---	---	---
	Trichlorofluoromethane	µg/L	520	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	Vinyl chloride	µg/L	0.019	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
SVOCs (SW8270D)	1,2,4,5-Tetrachlorobenzene	µg/L	0.17	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	1,4-Dioxane	µg/L	0.46	2021 May EPA Tapwater (THQ 0.1)	*10 UJ*	*10 U*	*11 UJ*	*10 UJ*	*9.9 UJ*	X	*11 UJ*
	2,2'-oxybis[1-chloropropane]	µg/L	71	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	X	X
	2,3,4,6-Tetrachlorophenol	µg/L	24	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 U	2.1 UJ	2.1 U	2 U	2.6 U	2.1 U
	2,4,5-Trichlorophenol	µg/L	120	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.6 U	2.1 U
	2,4,6-Trichlorophenol	µg/L	NA		2.1 U	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.6 U	2.1 U
	2,4-Dichlorophenol	µg/L	4.6	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.6 U	2.1 U
	2,4-Dimethylphenol	µg/L	36	2021 May EPA Tapwater (THQ 0.1)	10 U	10 U	11 UJ	10 U	9.9 U	13 U	11 U
	2,4-Dinitrotoluene	µg/L	0.24	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*

Table J-5
Validated Analytical Results - AOC 5 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-012		NYOW-05-016	NYOW-05-017-1	NYOW-05-019	NYOW-05-024	NYOW-05-025
				Parent Sample ID	NYOW-05-WL012-A		NYOW-05-WL016-A	NYOW-05-WL017-1-A	NYOW-05-WL019-A	NYOW-05-WL024-A	NYOW-05-WL025-A
				Sample ID	NYOW-05-WL012-A	WL-DUP-002_210114	NYOW-05-WL016-A	NYOW-05-WL017-1-A	NYOW-05-WL019-A	NYOW-05-WL024-A	NYOW-05-WL025-A
				Sample Type	N	FD	N	N	N	N	N
				Depth (feet)	16.5 - 26.5	16.5 - 26.5	18 - 28	18.5 - 28.5	9 - 19	11.17 - 21.17	12 - 22
				Date	1/14/2021	1/14/2021	1/15/2021	1/15/2021	1/15/2021	1/11/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
SVOCs (SW8270D)	2,6-Dinitrotoluene	µg/L	0.049	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	2-Chloronaphthalene	µg/L	75	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	2-Chlorophenol	µg/L	9.1	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 U	2.1 UJ	2.1 U	2 U	2.6 U	2.1 U
	2-Methylphenol	µg/L	93	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 U	2.1 UJ	2.1 U	2 U	2.6 U	2.1 U
	2-Nitroaniline	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	2-Nitrophenol	µg/L	NA		2.1 U	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.6 U	2.1 U
	3,3'-Dichlorobenzidine	µg/L	0.13	2021 May EPA Tapwater (THQ 0.1)	*62 UJ*	*63 U*	*64 UJ*	*62 UJ*	*60 UJ*	X	*63 UJ*
	3-Nitroaniline	µg/L	5	New York State Groundwater 703.5	*10 UJ*	*10 U*	*11 UJ*	*10 UJ*	*9.9 UJ*	X	*11 UJ*
	4,6-Dinitro-2-methylphenol	µg/L	0.15	2021 May EPA Tapwater (THQ 0.1)	*21 U*	*21 U*	*21 UJ*	*21 U*	*20 U*	*26 U*	*21 U*
	4-Bromophenyl phenyl ether	µg/L	NA		2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	4-Chloro-3-methylphenol	µg/L	140	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	2.6 U	2.1 U
	4-Chloroaniline	µg/L	0.37	2021 May EPA Tapwater (THQ 0.1)	*5.2 UJ*	*5.2 UJ*	*5.4 UJ*	*5.2 UJ*	*5 UJ*	X	*5.3 UJ*
	4-Chlorophenyl phenyl ether	µg/L	NA		2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	4-Nitroaniline	µg/L	3.8	2021 May EPA Tapwater (THQ 0.1)	*10 UJ*	*10 U*	*11 UJ*	*10 UJ*	*9.9 UJ*	X	*11 UJ*
	4-Nitrophenol	µg/L	NA		4.1 U	4.2 U	4.3 UJ	4.2 U	4 U	5.3 U	4.2 U
	Acetophenone	µg/L	190	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Atrazine	µg/L	0.3	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Benzaldehyde	µg/L	19	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Biphenyl	µg/L	0.083	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Bis(2-chloroethoxy)methane	µg/L	5.9	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Bis(2-chloroethyl)ether	µg/L	0.014	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Bis(2-ethylhexyl) phthalate	µg/L	5.6	2021 May EPA Tapwater (THQ 0.1)	2.6 UJ	2.6 U	2.7 UJ	2.6 UJ	2.5 UJ	X	2.6 UJ
	Butyl benzyl phthalate	µg/L	16	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Caprolactam	µg/L	990	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	**2.2 J-**	X	2.1 UJ
	Carbazole	µg/L	NA		2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Cresols, m- & p-	µg/L	93	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 U	2.1 UJ	2.1 U	2 U	2.6 U	2.1 U
	Di-n-butyl phthalate	µg/L	90	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Di-n-octyl phthalate	µg/L	20	2021 May EPA Tapwater (THQ 0.1)	2.6 UJ	2.6 U	2.7 UJ	2.6 UJ	2.5 UJ	X	2.6 UJ
	Dibenzofuran	µg/L	0.79	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Diethyl phthalate	µg/L	1500	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Dimethyl phthalate	µg/L	NA		2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Hexachlorobenzene	µg/L	0.0098	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Hexachlorobutadiene	µg/L	0.14	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Hexachlorocyclopentadiene	µg/L	0.041	2021 May EPA Tapwater (THQ 0.1)	*5.2 UJ*	*5.2 U*	*5.4 UJ*	*5.2 UJ*	*5 UJ*	X	*5.3 UJ*
	Hexachloroethane	µg/L	0.33	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 U*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Isophorone	µg/L	78	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 UJ	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	N-Nitrosodi-n-propylamine	µg/L	0.011	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	N-Nitrosodiphenylamine	µg/L	12	2021 May EPA Tapwater (THQ 0.1)	2.1 UJ	2.1 U	2.1 UJ	2.1 UJ	2 UJ	X	2.1 UJ
	Nitrobenzene	µg/L	0.14	2021 May EPA Tapwater (THQ 0.1)	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2.1 UJ*	*2 UJ*	X	*2.1 UJ*
	Pentachlorophenol	µg/L	0.041	2021 May EPA Tapwater (THQ 0.1)	*4.1 UJ*	*4.2 UJ*	*4.3 UJ*	*4.2 UJ*	*4 UJ*	*5.3 U*	*4.2 U*
	Phenol	µg/L	580	2021 May EPA Tapwater (THQ 0.1)	2.1 U	2.1 U	2.1 UJ	2.1 U	2 U	2.6 UJ	**2.5 J**
PAHs (SW8270D-SIM)	1-Methylnaphthalene	µg/L	1.1	2021 May EPA Tapwater (THQ 0.1)	0.039 U	0.043 U	**0.042 J**	**0.068 J-**	**0.19 J-**	**0.63 J-**	0.041 UJ
	2-Methylnaphthalene	µg/L	3.6	2021 May EPA Tapwater (THQ 0.1)	0.049 U	0.054 U	0.054 UJ	**0.11 J-**	**0.2 J-**	**0.89 J-**	0.051 UJ
	Acenaphthene	µg/L	53	2021 May EPA Tapwater (THQ 0.1)	0.012 U	0.013 U	0.013 UJ	0.013 UJ	**0.051 J-**	0.016 UJ	0.012 UJ
	Acenaphthylene	µg/L	NA		0.02 U	0.022 U	0.022 UJ	0.022 UJ	0.021 UJ	0.026 UJ	0.02 UJ
	Anthracene	µg/L	180	2021 May EPA Tapwater (THQ 0.1)	0.099 U	0.11 U	0.11 UJ	0.11 UJ	**0.071 J-**	0.13 UJ	0.1 UJ
	Benzo[a]anthracene	µg/L	0.03	2021 May EPA Tapwater (THQ 0.1)	*0.099 U*	*0.11 U*	**0.063 J**	*0.11 UJ*	**0.31 J-**	*0.13 UJ*	*0.1 UJ*
	Benzo[a]pyrene	µg/L	0.025	2021 May EPA Tapwater (THQ 0.1)	*0.049 U*	*0.054 U*	**0.056 J**	*0.055 UJ*	**0.31 J-**	*0.066 UJ*	*0.051 UJ*
	Benzo[b]fluoranthene	µg/L	0.25	2021 May EPA Tapwater (THQ 0.1)	0.099 U	0.11 U	**0.085 J**	0.11 UJ	**0.44 J-**	0.13 UJ	0.1 UJ
	Benzo[g,h,i]perylene	µg/L	NA		0.099 U	0.11 U	**0.049 J**	0.11 UJ	**0.17 J-**	0.13 UJ	0.1 UJ
	Benzo[k]fluoranthene	µg/L	2.5	2021 May EPA Tapwater (THQ 0.1)	0.049 U	0.054 U	**0.04 J**	0.055 UJ	**0.22 J-**	0.066 UJ	0.051 UJ
	Chrysene	µg/L	25	2021 May EPA Tapwater (THQ 0.1)	0.099 U	0.11 U	**0.092 J**	0.11 UJ	**0.35 J-**	0.13 UJ	**0.051 J-**
	Dibenz(a,h)anthracene	µg/L	0.025	2021 May EPA Tapwater (THQ 0.1)	*0.099 UJ*	*0.11 UJ*	*0.11 UJ*	*0.11 UJ*	**0.05 J-**	*0.13 UJ*	*0.1 UJ*
	Fluoranthene	µg/L	80	2021 May EPA Tapwater (THQ 0.1)	0.099 U	0.11 U	**0.11 J**	0.11 UJ	**0.6 J-**	0.13 UJ	0.1 UJ
	Fluorene	µg/L	29	2021 May EPA Tapwater (THQ 0.1)	0.039 U	0.043 U	0.043 UJ	0.044 UJ	0.041 UJ	0.053 UJ	0.041 UJ
	Indeno[1,2,3-cd]pyrene	µg/L	0.25	2021 May EPA Tapwater (THQ 0.1)	0.099 U	0.11 U	**0.045 J**	0.11 UJ	**0.21 J-**	0.13 UJ	0.1 UJ
	Naphthalene	µg/L	0.12	2021 May EPA Tapwater (THQ 0.1)	**0.11 J+**	**0.12 J+**	**0.13 J**	**0.18 J**	**0.23 J**	**0.97 J-**	0.051 UJ
	Phenanthrene	µg/L	NA		0.099 U	0.11 U	**0.11 J**	**0.11 J-**	**0.42 J-**	**0.24 J-**	0.1 UJ
	Pyrene	µg/L	12	2021 May EPA Tapwater (THQ 0.1)	0.099 U	0.11 U	**0.11 J**	0.11 UJ	**0.48 J-**	0.13 UJ	0.1 UJ

Table J-5
Validated Analytical Results - AOC 5 Groundwater
Phase 1 Field Investigation Report - AOC 4 and AOC 5
Former New York Ordnance Works, Baldwinsville, New York

				Location ID	NYOW-05-012		NYOW-05-016	NYOW-05-017-1	NYOW-05-019	NYOW-05-024	NYOW-05-025
				Parent Sample ID	NYOW-05-WL012-A		NYOW-05-WL016-A	NYOW-05-WL017-1-A	NYOW-05-WL019-A	NYOW-05-WL024-A	NYOW-05-WL025-A
				Sample ID	NYOW-05-WL012-A	WL-DUP-002_210114	NYOW-05-WL016-A	NYOW-05-WL017-1-A	NYOW-05-WL019-A	NYOW-05-WL024-A	NYOW-05-WL025-A
				Sample Type	N	FD	N	N	N	N	N
				Depth (feet)	16.5 - 26.5	16.5 - 26.5	18 - 28	18.5 - 28.5	9 - 19	11.17 - 21.17	12 - 22
				Date	1/14/2021	1/14/2021	1/15/2021	1/15/2021	1/15/2021	1/11/2021	1/12/2021
Method	**Analyte**	**Units**	**PAL**	**PAL Reference**							
PCBs (SW8082A)	PCB-1016	µg/L	0.14	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1221	µg/L	0.0047	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1232	µg/L	0.0047	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1242	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1248	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1254	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1260	µg/L	0.0078	2021 May EPA Tapwater (THQ 0.1)	---	---	---	---	---	---	---
	PCB-1262	µg/L	NA		---	---	---	---	---	---	---
	PCB-1268	µg/L	NA		---	---	---	---	---	---	---
TAL Metals, Dissolved (SW6010C/SW6020A/ SW7470A)	Aluminum	µg/L	2000	2021 May EPA Tapwater (THQ 0.1)	70 U	70 U	**26 J**	**18 J**	**27 J**	**2100**	**36 J**
	Antimony	µg/L	0.78	2021 May EPA Tapwater (THQ 0.1)	*1 U*	*1 U*	**1.1 J**	**1.5 J**	**2.2 J**	*1 U*	*1 U*
	Arsenic	µg/L	0.052	2021 May EPA Tapwater (THQ 0.1)	**1.1 J**	**1.8 J**	**9**	**2.9 J**	**140**	**2.4 J**	**0.49 J**
	Barium	µg/L	380	2021 May EPA Tapwater (THQ 0.1)	**210 J**	**210**	**150**	**84**	**23**	**130**	**55**
	Beryllium	µg/L	2.5	2021 May EPA Tapwater (THQ 0.1)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Cadmium	µg/L	0.92	2021 May EPA Tapwater (THQ 0.1)	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*	*1.8 U*
	Calcium	µg/L	NA		**91000 J**	**98000**	**31000**	**25000**	**37000**	**110000**	**110000**
	Chromium	µg/L	2200	2021 May EPA Tapwater (THQ 0.1)	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	**12**	**0.52 J**
	Cobalt	µg/L	0.6	2021 May EPA Tapwater (THQ 0.1)	**1**	**0.42 J**	**0.41 J**	**0.17 J**	**0.14 J**	**3.7**	**1.3**
	Copper	µg/L	80	2021 May EPA Tapwater (THQ 0.1)	10 U	10 U	10 U	10 U	10 U	**6.5 J**	10 U
	Iron	µg/L	1400	2021 May EPA Tapwater (THQ 0.1)	**470 J**	**890 J**	**100**	85 U	85 U	**6300**	100 U
	Lead	µg/L	15	2021 May EPA Tapwater (THQ 0.1)	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	**1.4 J**	0.7 U
	Magnesium	µg/L	NA		**61000 J**	**58000**	**23000**	**15000**	**2400**	**37000**	**22000**
	Manganese	µg/L	43	2021 May EPA Tapwater (THQ 0.1)	**170 J**	**160**	**170**	**29**	**3.9 J**	**1200**	**1200**
	Mercury	µg/L	0.063	2021 May EPA Tapwater (THQ 0.1)	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*	*0.08 U*
	Nickel	µg/L	39	2021 May EPA Tapwater (THQ 0.1)	8 U	8 U	8 U	8 U	8 U	**16 J**	**3.7 J**
	Selenium	µg/L	10	2021 May EPA Tapwater (THQ 0.1)	*19 U*	*19 U*	*19 UJ*	*19 UJ*	*19 UJ*	*19 U*	*19 U*
	Silver	µg/L	9.4	2021 May EPA Tapwater (THQ 0.1)	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Sodium	µg/L	20000	New York State Groundwater 703.5	**65000 J**	**71000**	**18000**	**18000**	**33000**	**93000**	**20000**
	Thallium	µg/L	0.02	2021 May EPA Tapwater (THQ 0.1)	*0.2 U*	*0.2 U*	*0.2 U*	*1 U*	*0.2 U*	*0.2 U*	*0.2 U*
	Vanadium	µg/L	8.6	2021 May EPA Tapwater (THQ 0.1)	4 U	4 U	4 U	4 U	**7.4 J**	**3.8 J**	4 U
	Zinc	µg/L	600	2021 May EPA Tapwater (THQ 0.1)	15 U	15 U	15 U	15 U	15 U	**8.2 J**	15 U

Bold - detected

Bolded and shaded - detected concentration exceeds Project Action Limit (PAL).

Underlined and italicized - non-detect value is greater than PAL.

Abbreviations and Symbols

"---" - Not requested

"-A" in sample ID indicates shallow water-bearing zone.

FD - field duplicate sample

N - normal sample

NA - not applicable

WL - temporary well groundwater sample

µg/L - micrograms per liter

Validation Qualifiers

J - Estimated. The analyte was positively identified; the quantitation is an estimation.

J+ - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased high.

J- - Estimated. The analyte was positively identified; the quantitation is an estimation, which may be biased low.

U - Non-detect at Limit of Detection (LOD).

UJ - Estimated. The analyte was non-detect at the LOD; the quantitation is an estimation.

X - The presence or absence of the analyte cannot be substantiated by the data provided.

References

2021 May EPA Tapwater (THQ 0.1) - Environmental Protection Agency May 2021 Tapwater Regional Screening Levels
(Total Hazard Quotient = 0.1, Target Risk = 1E-06)

New York State Groundwater 703.5 - New York State Department of Environmental Conservation (NYSDEC; 6 NYCRR Part 703-5, 2019):
Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations – Groundwater standards

APPENDIX K

Coal Ash Report

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2/23/2021

Accreditation# 98218

Bluestone Environmental

MicroVision Labs Coal Ash Report, Job # 14258
Bluestone Project#: W912WJ.19D0001.19F0056.0400.L
Bluestone Project Name: New York Ordinance Works-AOC5

Scope of Work:

This report covers the methods and findings of the Coal/Coal Ash analysis that MicroVision Laboratories, Inc. conducted on eleven (11) soil samples submitted for testing from the New York Ordinance Works project, number W912WJ.19D0001.19F0056.0400.L. The purpose of this analysis was to detect and document any coal, coal ash, wood ash or asphalt that may be present in the submitted soil samples by use of a combination of microscopy techniques including SEM/EDS, PLM, and macroscopic inspection. The chronology of these samples was 1/15/2021 at 1420 (sample preparation) and 1/18/2021 at 1020 (sample analysis). Instrument calibration for SEM/EDS was on 1/7/2021.

Methods:

MicroVision Labs is accredited to the ISO/IEC 17025:2017 standard. This analysis follows our in house SOP #MVL05 (Microscopic Analysis for Coal, Coal Ash and Wood Ash). This method is listed on our certificate of accreditation and has been validated.

Findings:

The following pages display the data for each particle type detected in each sample for this project. Each page contains a PLM image, SEM image, and EDS spectrum for the particle types detected for these samples as well as particle type descriptions and observations.

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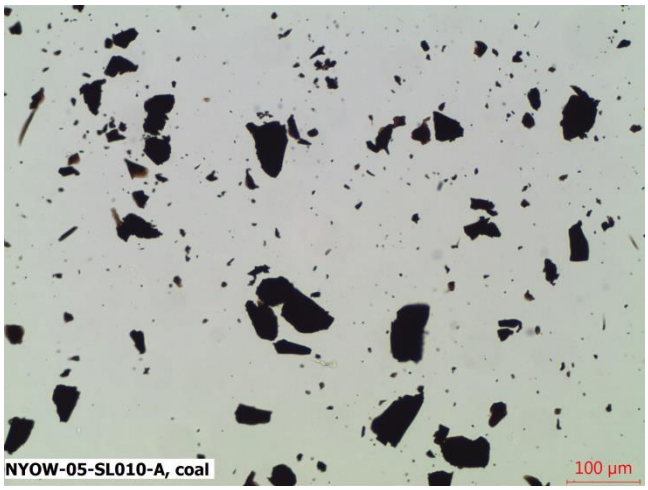
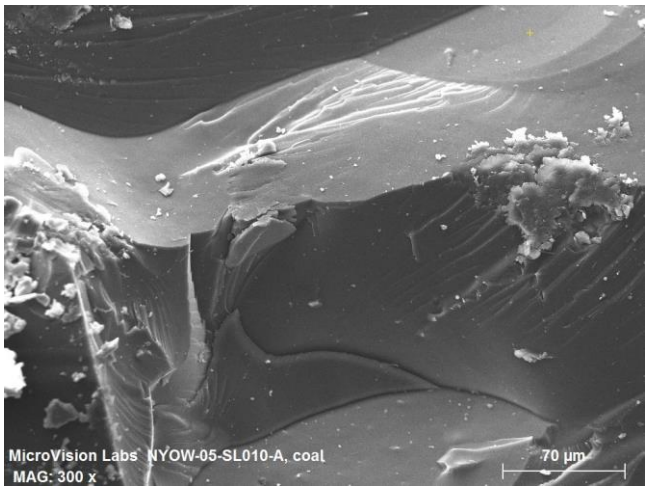
Sample 1: NYOW-05-SL010-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of hundreds (100+) of shiny, black grains approximately 1-15mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

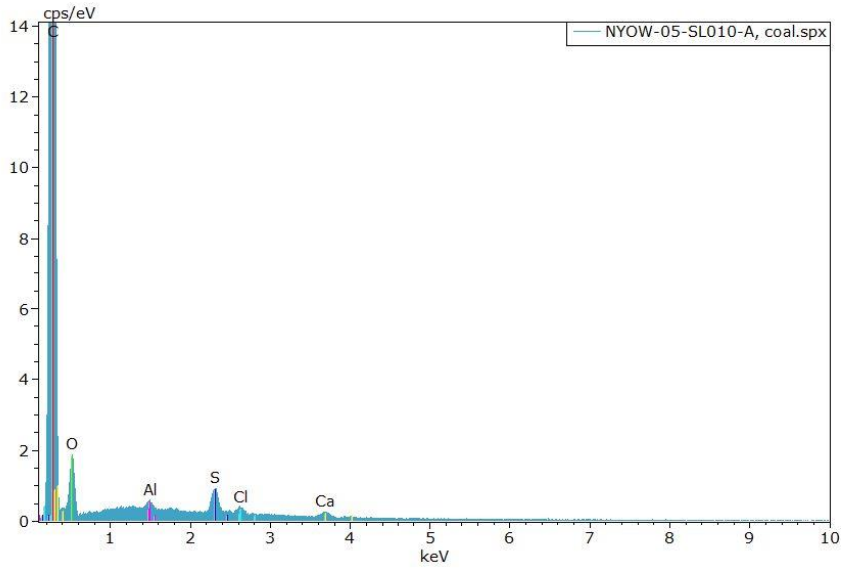


PLM Image



SEM Image

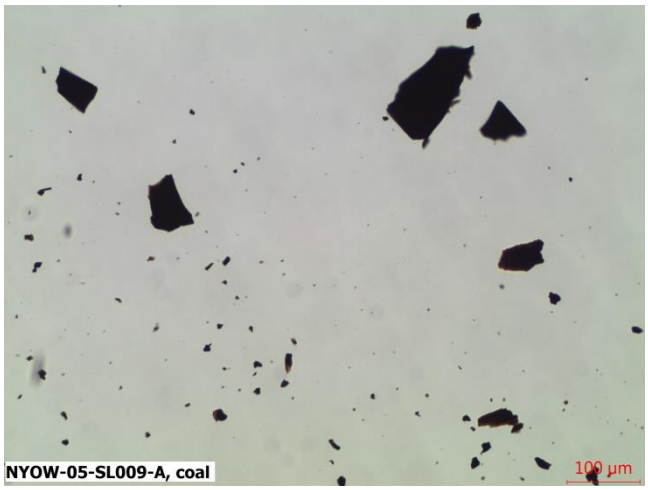
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, sulfur, chlorine and calcium.



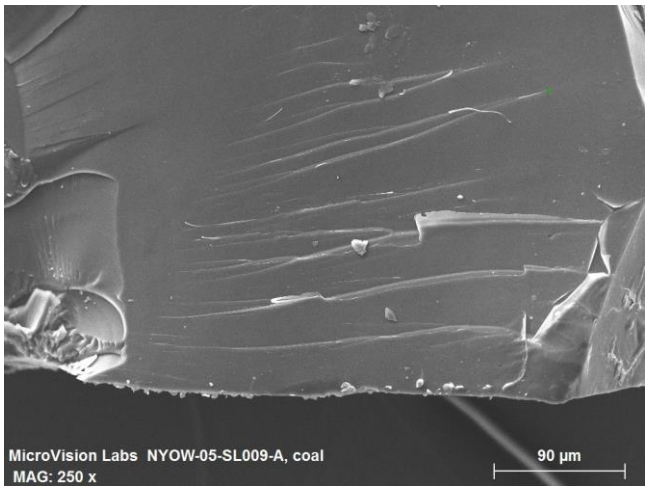
Sample 2: NYOW-05-SL009-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of hundreds (100+) of shiny, black grains approximately 1-10mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

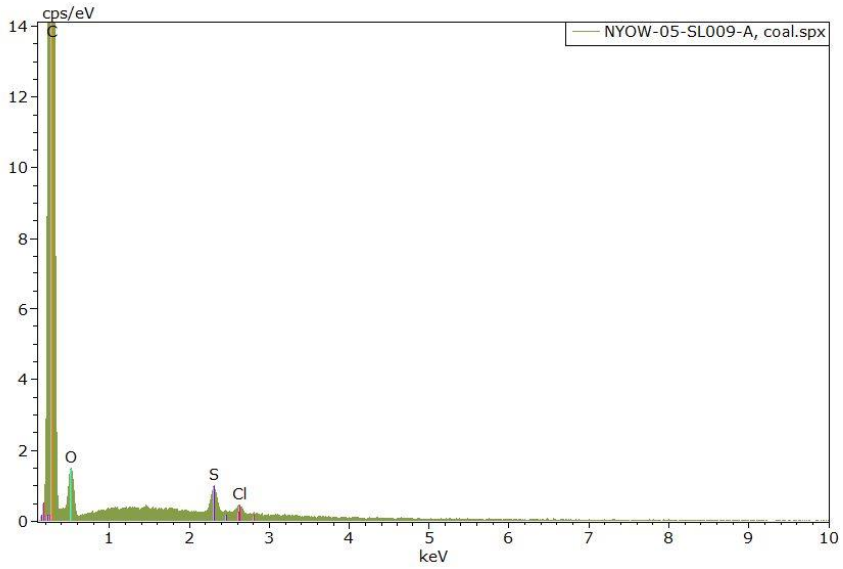


PLM Image



SEM Image

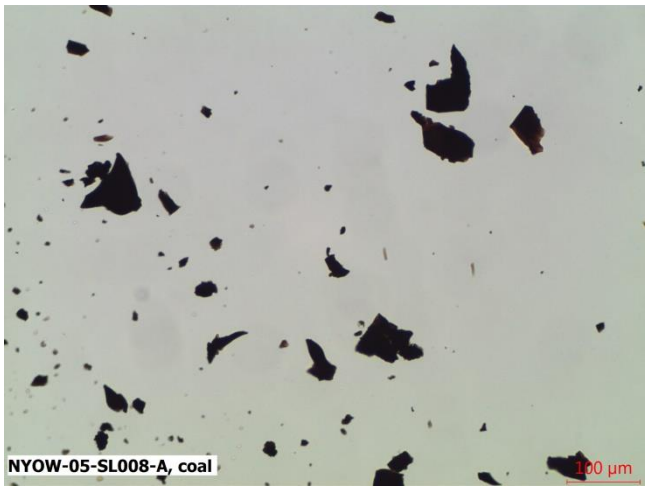
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, sulfur and chlorine.



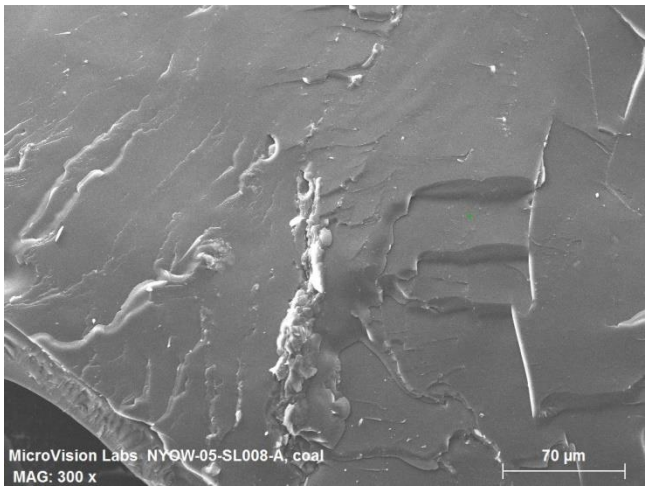
Sample 3: NYOW-05-SL008-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of hundreds (100+) of shiny, black grains approximately 1-35mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

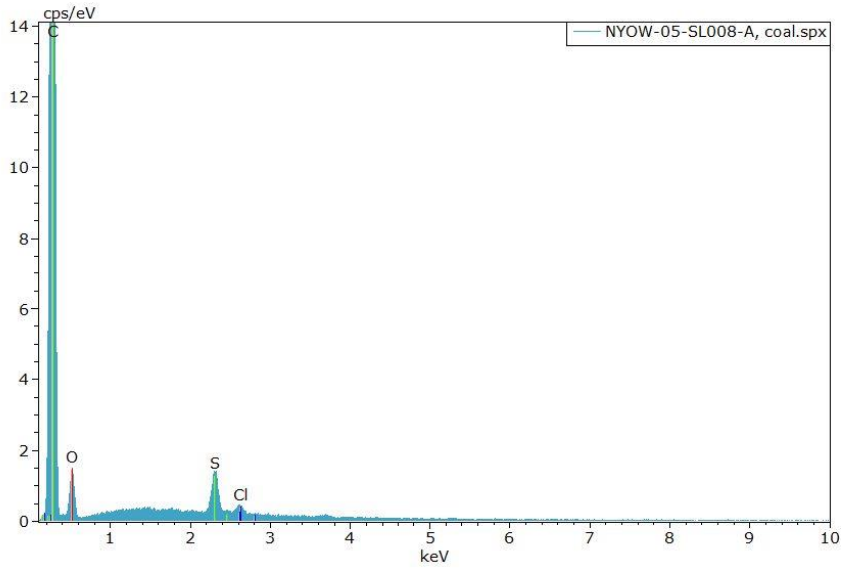


PLM Image



SEM Image

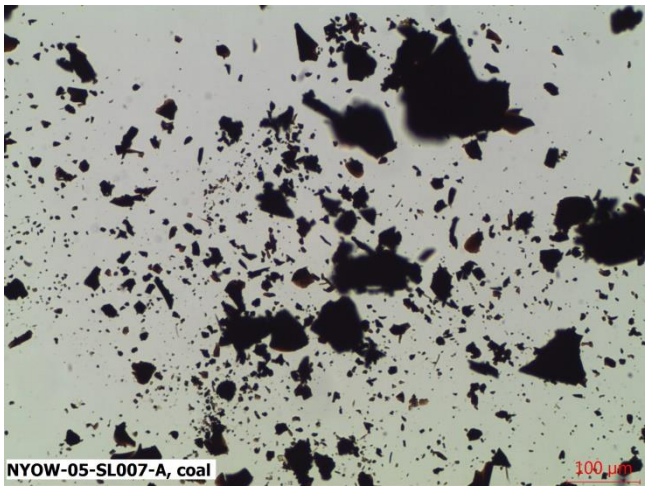
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, sulfur and chlorine.



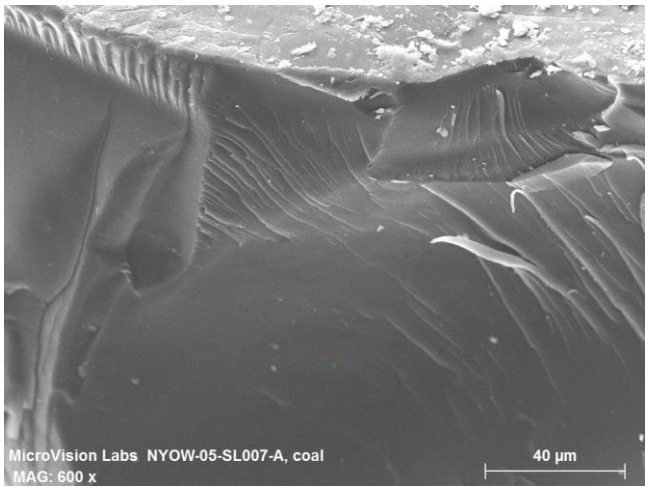
Sample 4: NYOW-05-SL007-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of hundreds (100+) of shiny, black grains approximately 1-25mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

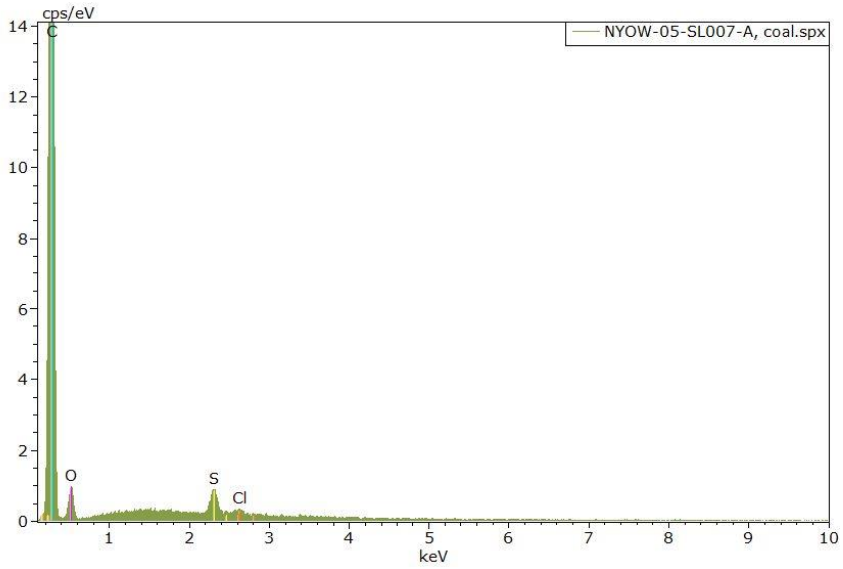


PLM Image



SEM Image

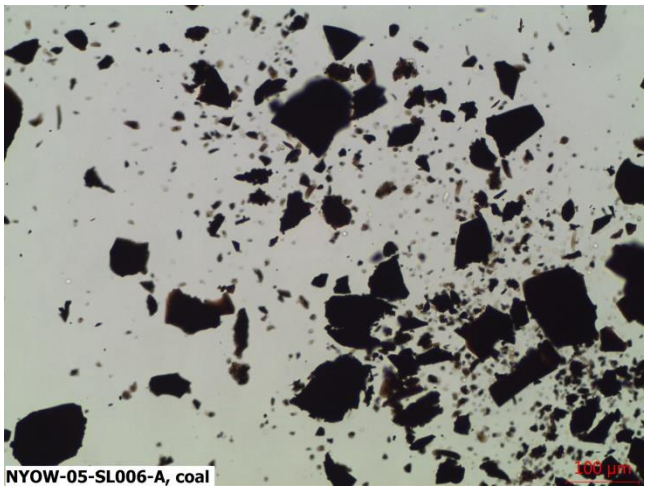
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, sulfur and chlorine.



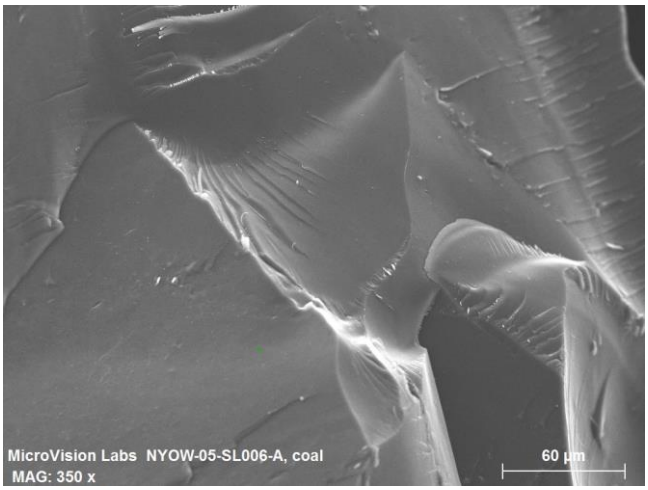
Sample 5: NYOW-05-SL006-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of over fifty (50+) shiny, black grains approximately 1-20mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

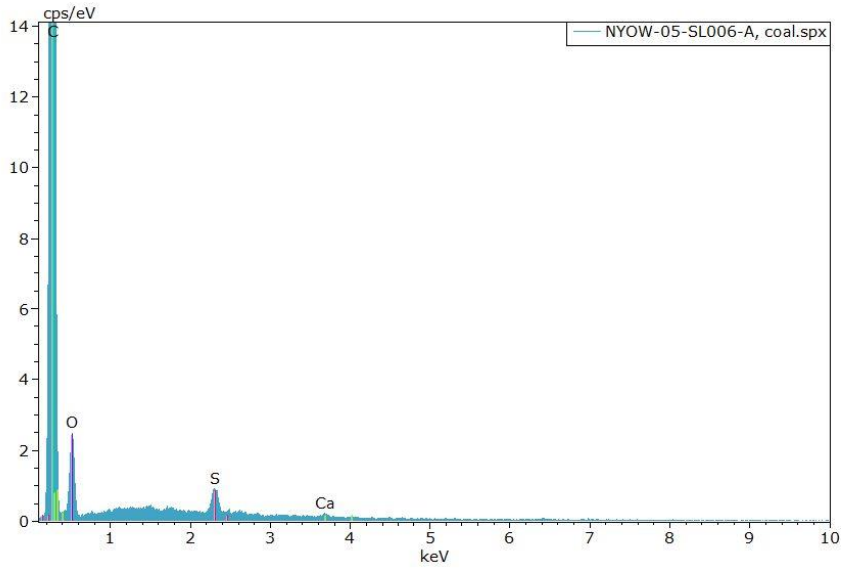


PLM Image



SEM Image

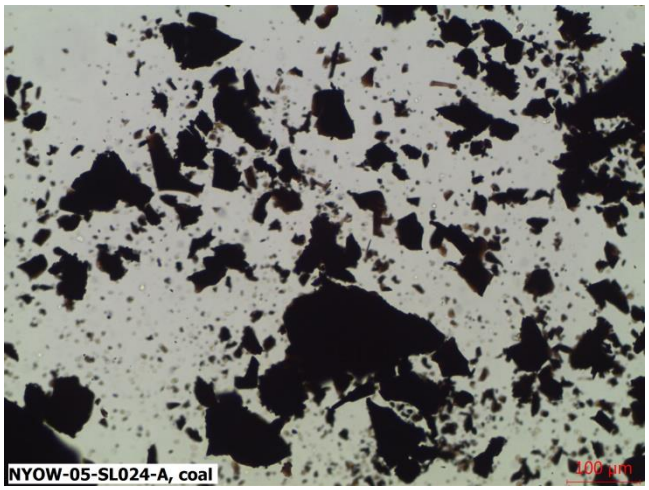
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, sulfur and calcium.



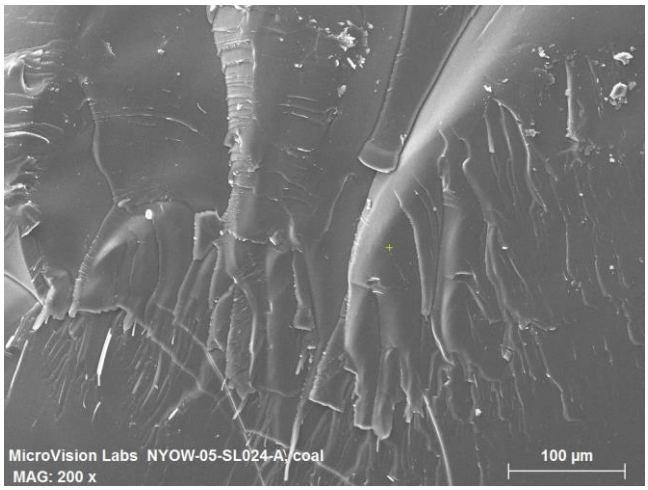
Sample 6: NYOW-05-SL024-A

Number of Suspect Particle Types: Two (2)

Coal: This particle type consisted of hundreds (100+) of shiny, black grains approximately 1-30mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

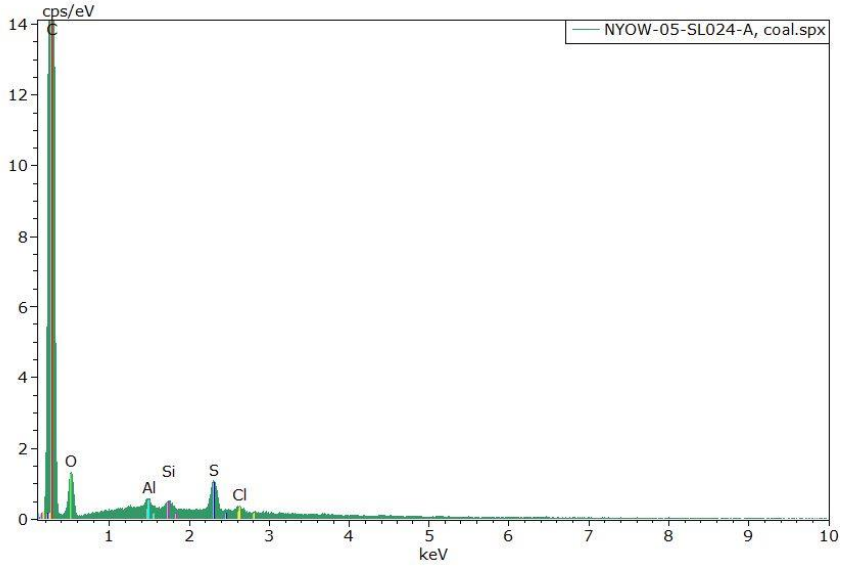


PLM Image

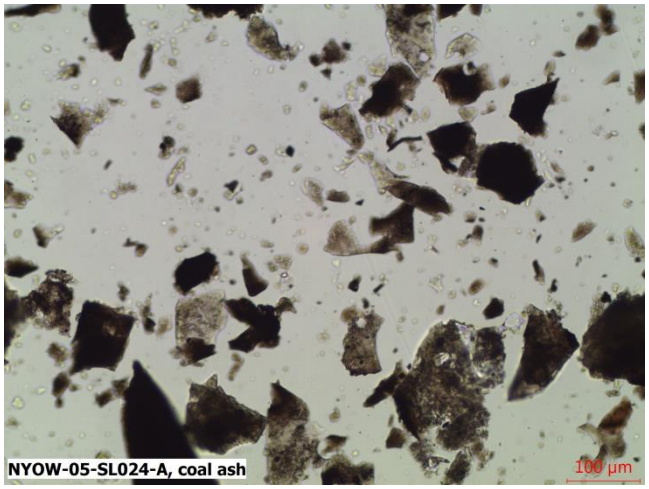


SEM Image

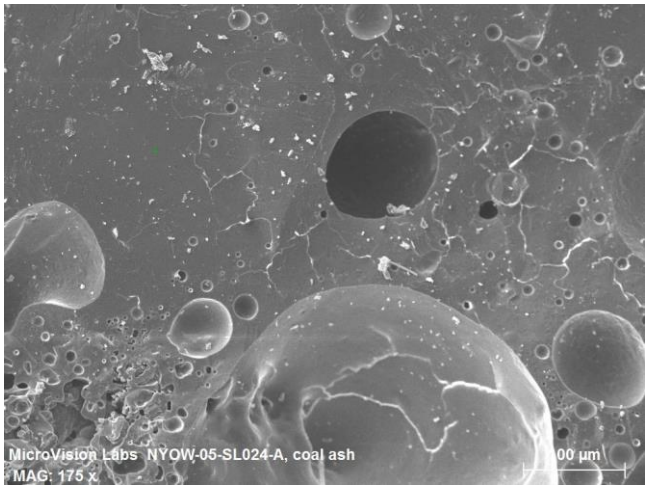
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, silicon, sulfur and chlorine.



Coal Ash: This particle type consisted of thirty to thirty-five (30-35) dark, porous grains approximately 1-8mm in diameter. The PLM examination indicated this particle type to be consistent with coal ash. The PLM and SEM images show the spherical gas voids that formed during combustion.

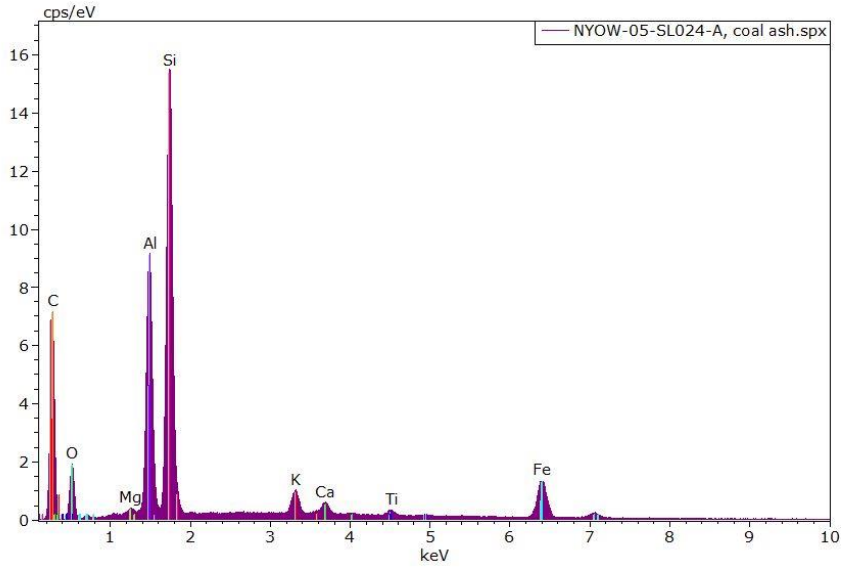


PLM Image



SEM Image

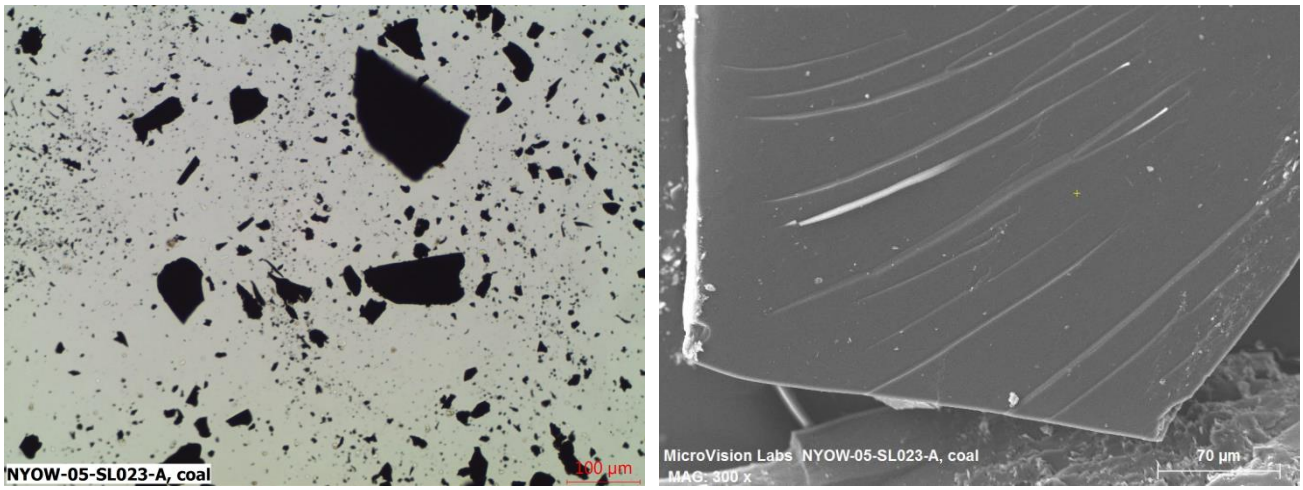
The EDS spectrum, shown below, indicates this particle type is coal ash. The analysis for this particle shows concentrations of carbon, oxygen, magnesium, aluminum, silicon, potassium, calcium, titanium and iron.



Sample 7: NYOW-05-SL023-A

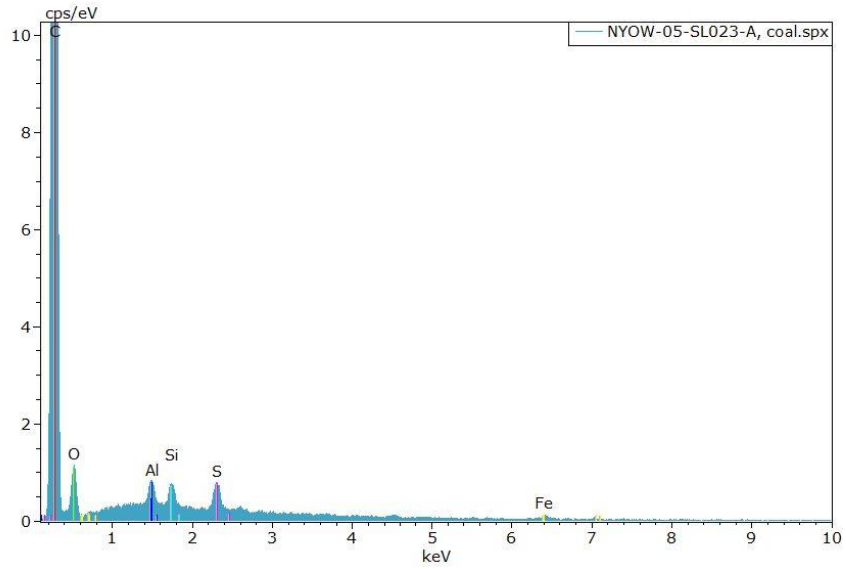
Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of over fifty (50+) shiny, black grains approximately 1-25mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.



PLM Image **SEM Image**

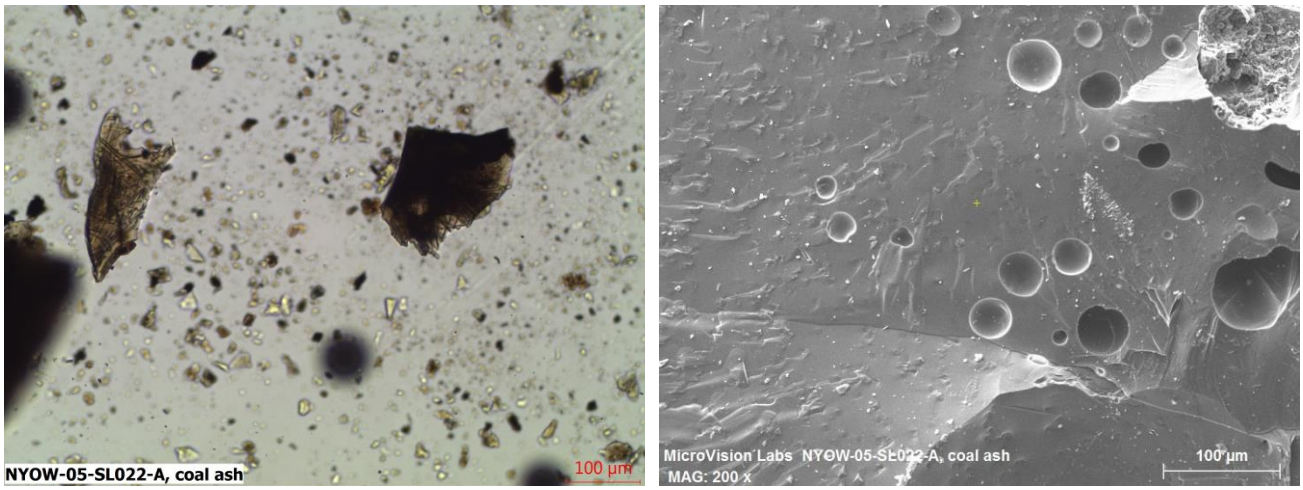
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, silicon, sulfur and iron.



Sample 8: NYOW-05-SL022-A

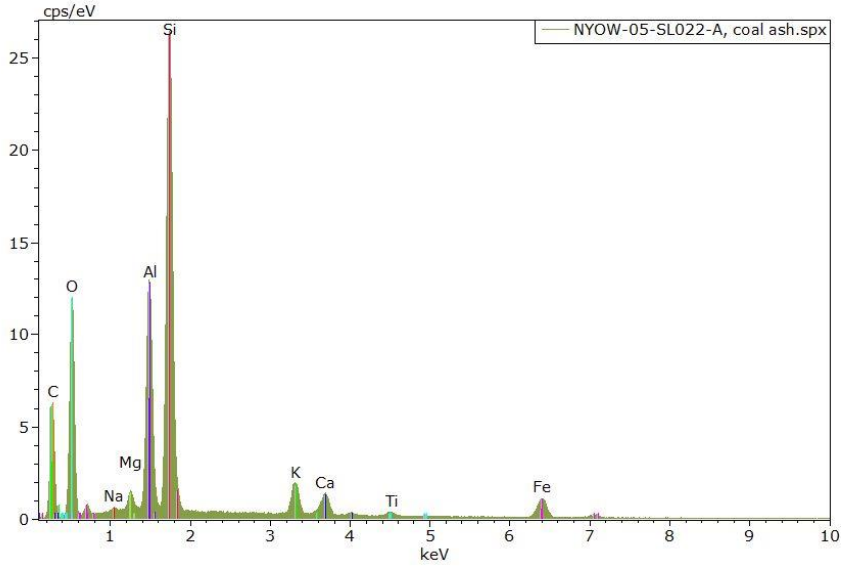
Number of Suspect Particle Types: One (1)

Coal Ash: This particle type consisted of one (1) dark, porous grain approximately 4mm in diameter. The PLM examination indicated this particle type to be consistent with coal ash. The PLM and SEM images show the spherical gas voids that formed during combustion.



PLM Image **SEM Image**

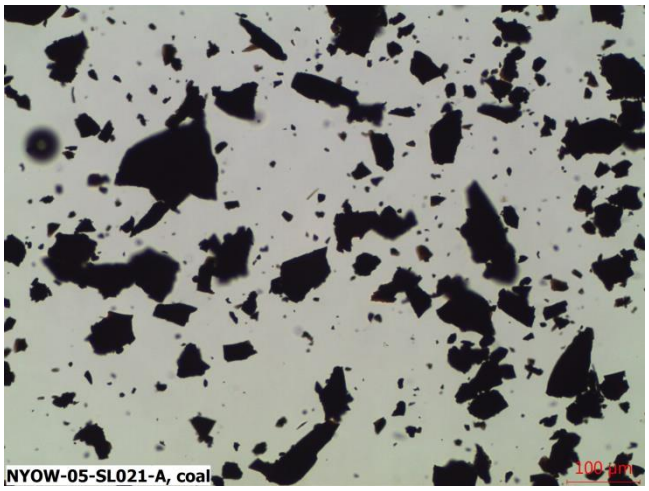
The EDS spectrum, shown below, indicates this particle type is coal ash. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, potassium, calcium, titanium and iron.



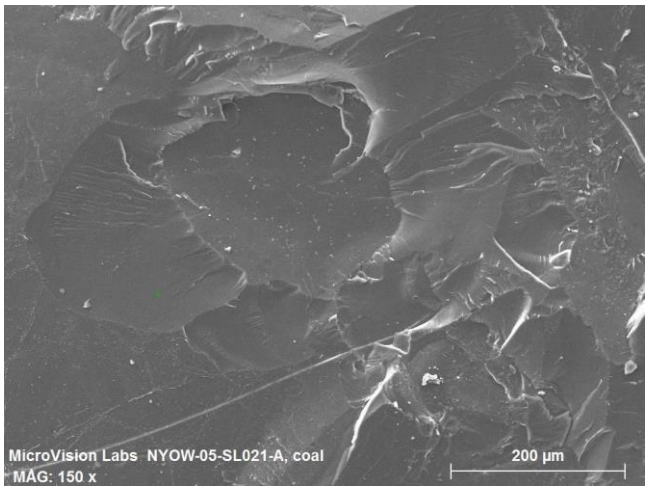
Sample 9: NYOW-05-SL021-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of over fifty (50+) shiny, black grains approximately 1-15mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

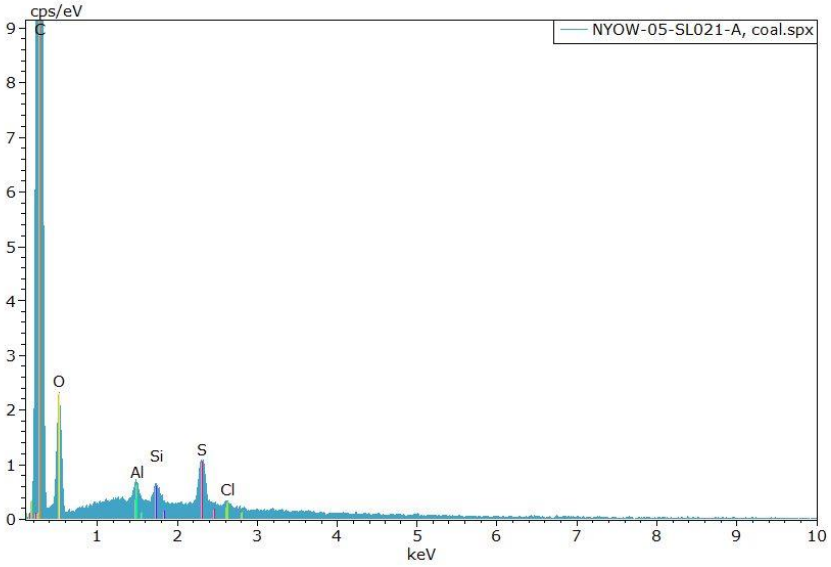


PLM Image



SEM Image

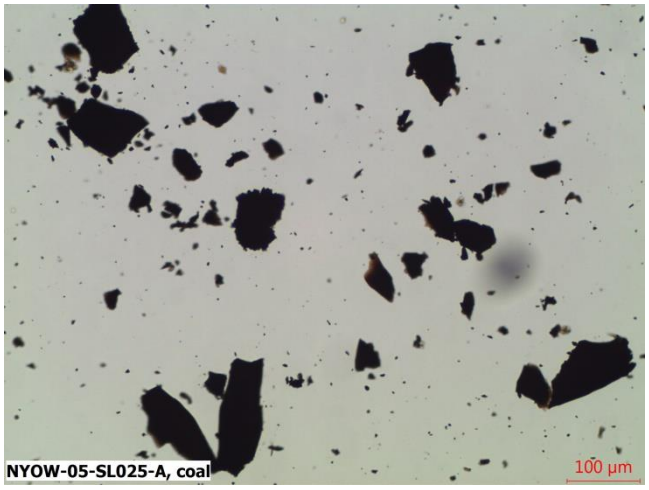
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, silicon, sulfur and chlorine.



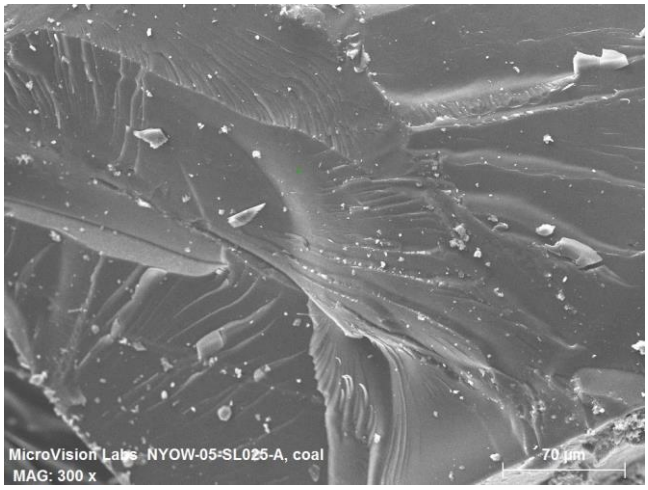
Sample 10: NYOW-05-SL025-A

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of twenty-five to thirty (25-30) shiny, black grains approximately 1-7mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

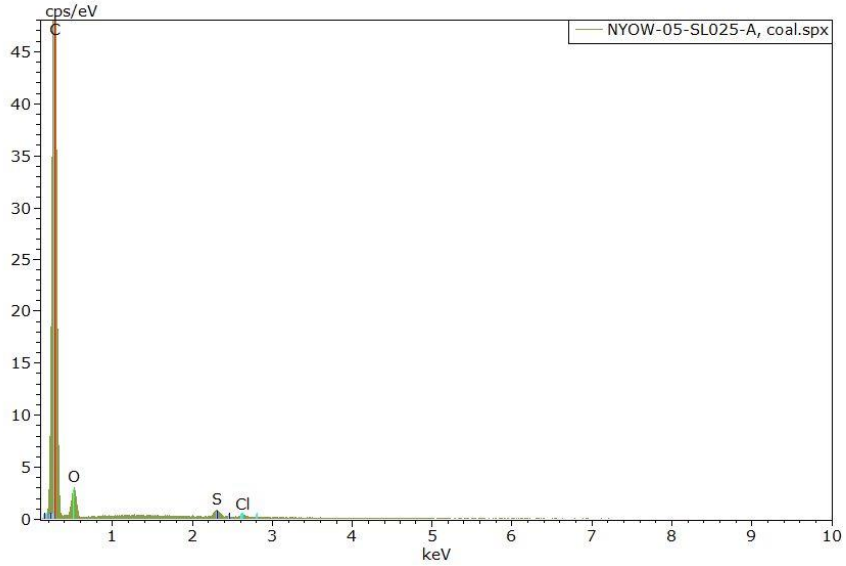


PLM Image



SEM Image

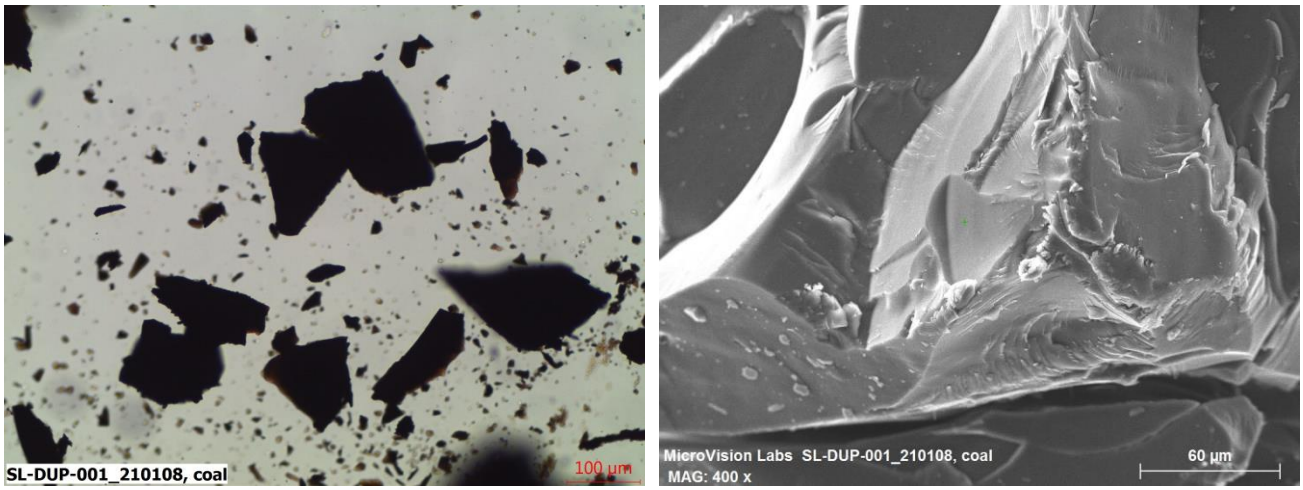
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, sulfur and chlorine.



Sample 11: SL-DUP-001_210108

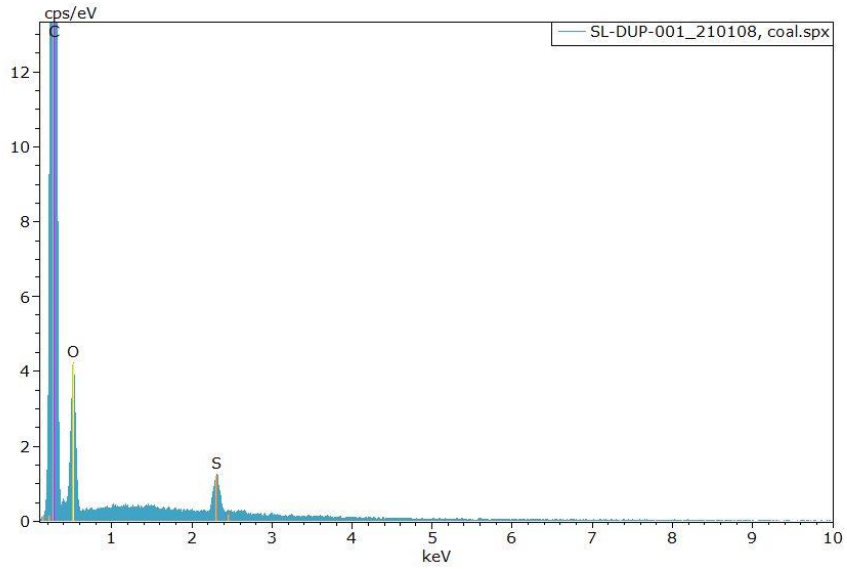
Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of over fifty (50+) shiny, black grains approximately 1-20mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.



PLM Image **SEM Image**

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen and sulfur.



Results Summary Table:

Sample Name	Material Detected
NYOW-05-SL010-A	Coal (very heavy)
NYOW-05-SL009-A	Coal (very heavy)
NYOW-05-SL008-A	Coal (very heavy)
NYOW-05-SL007-A	Coal (very heavy)
NYOW-05-SL006-A	Coal (heavy)
NYOW-05-SL024-A	Coal (very heavy), Coal Ash (moderate)
NYOW-05-SL023-A	Coal (heavy)
NYOW-05-SL022-A	Coal Ash (trace)
NYOW-05-SL021-A	Coal (heavy)
NYOW-05-SL025-A	Coal (moderate)
SL-DUP-001_210108	Coal (heavy)

The concentrations of the particle types detected in each sample are listed in parenthesis in the table above and are based on the number of particles found and the relative difficulty in finding them. The concentration information is listed for informational purposes only and has no bearing on exemption status.

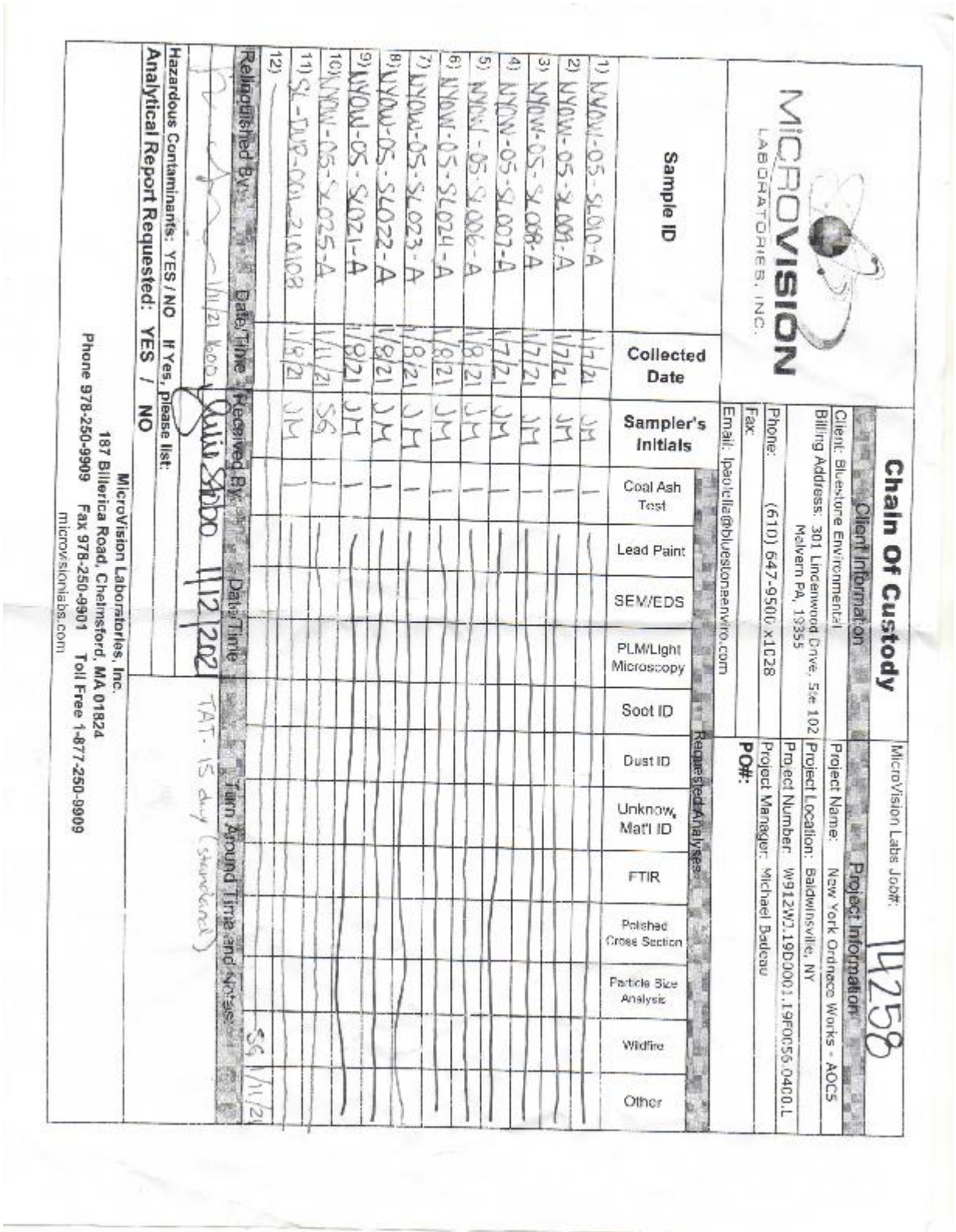
Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,



Audra Chaput
Analytical Microscopist

Reviewed by: DW



MICROVISION LABORATORIES, INC.

Chain Of Custody

MicroVision Labs Job#: 14258

Client Information

Client: Bluestone Environmental
Billing Address: 301 Lindenwood Drive, Ste 102 Malvern PA, 19355
Phone: (610) 647-9500 x1028
Fax:
Email: lpaolella@bluestoneenviro.com

Project Information

Project Name: New York Ordnance Works - AOC5
Project Location: Baldwinsville, NY
Project Number: W912WJ-19D0001-19F0055-0400-L
Project Manager: Michael Badeau
PO#:

Sample ID	Collected Date	Sampler's Initials	Requested Analyses: Coal Ash Test	Lead Paint	SEM/EDS	PLM/Light Microscopy	Soot ID	Dust ID	Unknown Mat'l ID	FTIR	Polished Cross Section	Particle Size Analysis	Wildfire	Other
1) NYOW-05-SL010-A	1/7/21	JM	1											
2) NYOW-05-SL001-A	1/7/21	JM	1											
3) NYOW-05-SL008-A	1/7/21	JM	1											
4) NYOW-05-SL007-A	1/7/21	JM	1											
5) NYOW-05-SL006-A	1/8/21	JM	1											
6) NYOW-05-SL024-A	1/8/21	JM	1											
7) NYOW-05-SL023-A	1/8/21	JM	1											
8) NYOW-05-SL022-A	1/8/21	JM	1											
9) NYOW-05-SL021-A	1/8/21	JM	1											
10) NYOW-05-SL025-A	1/11/21	SG	1											
11) SL-DUP-001-210108	1/8/21	JM	1											
12)														

Relinquished By: Date/Time: 1/12/21 1000 Received By: Date/Time: 1/12/202

Turn Around Time and Notes: TAT- 15 day (standard) SG 1/11/21

Hazardous Contaminants: YES / NO If Yes, please list:

Analytical Report Requested: YES / NO

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