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Engineers and
Scientists

Operable Unit No. 4 – 22 Oak Street Excavation
Interim Remedial Measure Work Plan

Bay Shore/Brightwaters Former MGP Site

Operable Unit No. 4
Town of Islip
AOC Index No. D1-0001-98-11

Submitted to:
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August 2023
Project 093180-4-1418

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Abbreviations and Acronyms

AOC	Administrative Order on Consent
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CM	Construction Manager
CRZ	Contamination Reduction Zone
D&B	Dvirka and Bartilucci
DER	Department of Environmental Remediation
EPA	United States Environmental Protection Agency
EZ	Exclusion Zone
frac	Fractionation
GEI	GEI Consultants, Inc.
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
ISCO	In-Situ Chemical Oxidation
LILCO	Long Island Lighting Company
LIRR	Long Island Railroad
MGP	Manufactured Gas Plant
NAPL	Non-Aqueous Phase Liquid
NYCRR	New York Codes, Rules, and Regulations
NYS ELAP	New York State Environmental Laboratory Approval Program
NYSASP	New York State Analytical Service Protocol
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PDI	Pre-design Investigation
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PPE	Personal Protective Equipment
RAO	Remedial Action Objective

RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SCDHS	Suffolk County Department of Health Services
SCDPW	Suffolk County Department of Public Works
SCGs	Standards, Criteria, and Guidance
SCOs	Soil Cleanup Objective
SMP	Site Management Plan
SVOCs	Semi-Volatile Organic Compounds
SZ	Support Zone
TFS	Temporary Fabric Structure
TOI	Town of Islip
VOCs	Volatile Organic Compounds
MEASUREMENTS	
ft bgs	feet below ground surface
ft msl	feet above mean sea level
mg/kg	milligrams per kilogram
ppm	parts per million

Professional Engineer's Certification

I, Matthew O'Neil, certify that I am currently a NYS registered professional engineer and that this Work Plan was prepared in substantial accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

8/25/23

Date

Matthew J. O'Neil, P.E.
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1. Introduction

GEI Consultants Inc., P.C. (GEI) has prepared this Excavation Interim Remedial Measure (IRM) Work Plan on behalf of National Grid to address Manufactured Gas Plant (MGP) related impacts detected in the subsurface soils beneath portions of the building currently located on 22 Oak Street within the Bay Shore/Brightwaters Former MGP Site Operable Unit No. 4 (OU-4) Cesspool Area. MGP impacted soil identified beneath the building on 22 Oak Street was inaccessible during previous excavation IRMs performed within OU-4. The MGP impacts adjacent to the 22 Oak Street building were excavated in 2011 in accordance with the New York State Department of Environmental Conservation (NYSDEC) letter to National Grid dated November 4, 2010, which specified excavation of areas where MGP-related source material impacts still exists to a depth of 10 feet below ground surface (ft bgs). The 22 Oak Street property is in the planning stages for redevelopment which would include demolition of the existing building. The planned redevelopment will allow access to the MGP impacted soil. Once the building is demolished, the proposed excavation work will take place prior to redevelopment. For the purposes of this IRM Work Plan, the term "Site" refers to the 22 Oak Street property. The Site Location Map and Site Plan are provided in Figs. 1 and 2, respectively.

This IRM Work Plan has been prepared in accordance with the Administrative Order on Consent (AOC), Index Number D1-0001-98-11 (the Order) with the NYSDEC, the factors set forth in Title 6 of the New York Code of Rules and Regulations Part 375 (6 NYCRR Part 375) for interim remedial measures, and NYSDEC *DER-10* [Department of Environmental Remediation] *Technical Guidance for Site Investigation and Remediation*, dated May 3, 2010. This IRM is based off the NYSDEC approved Bay Shore/Brightwaters Former MGP Site OU-4 Cesspool Area and Pond Area Excavation Interim Remedial Measure Work Plan dated January 31, 2011.

The remedial action goals and objectives as well as the techniques used for material handling, waste characterization, processing, transportation, and disposal of the MGP-related source material are described herein. This effort will be performed under the approval and oversight of the NYSDEC.

1.1 Work Plan Organization

This IRM Work Plan has been organized as follows.

- Section 1, the introduction, describes the purpose and objectives of the IRM. It also includes a Site description and historical information relative to the Site and previous Site investigations and remediations.

- Section 2 presents the IRM goals and objectives.
- Section 3 presents a summary of the IRM scope of work.
- Section 4 presents the vapor/odor management program.
- Section 5 describes the erosion and sediment control plan.
- Section 6 presents the Site security plan.
- Section 7 presents the equipment decontamination plan.
- Section 8 includes the waste management practices for the IRM.
- Section 9 provides sample methodology.
- Section 10 provides the plan for managing wastewater generated during construction activities.
- Section 11 outlines the traffic control concerns and measures for the Site.
- Section 12 presents the completion requirements for the IRM.
- Section 13 discusses the IRM Construction Completion Report (CCR) to be prepared following completion of the remedial action.
- Section 14 presents the references cited in the work plan.

1.2 Site Description and History

The Bay Shore Former MGP Site is located near the south shore of Long Island, approximately 6,000 feet north of the Great South Bay. The former MGP Site is currently divided into four OUs (Fig. 1). OU-1 consists of the former MGP main operations area and the parcels immediately downgradient and to the west of the main operations area. OU-2 includes the groundwater plume extending south of OU-1. OU-3 is located west of OU-1 and includes the Brightwaters Yard and the associated downgradient groundwater plume. OU-4 is located approximately 350 feet east of OU-1 and includes the former Cesspool and Pond Areas and the downgradient Watchogue Creek. The Cesspool Area is located on a portion of the Town of Islip (TOI) Long Island Railroad (LIRR) parking lot and a portion of the 22 Oak Street property (Fig. 2). The 22 Oak Street property prior uses included a petroleum distribution facility. The focus of this IRM Work Plan is the MGP-related impacts on the portion of the OU-4 Cesspool Area located beneath and immediately adjacent to portions of the building currently located on 22 Oak Street. The area surrounding OU-4 consists of residential and commercial properties.

The Bay Shore MGP began operations in the late 1880s. The plant was operated by Mutual Gas and Light Company, the Suffolk Gas and Electric Light Company and later the Long Island Lighting Company (LILCO) in 1918. LILCO operated the plant from 1918 to approximately 1973 when most of the facilities were demolished. In 1998, KeySpan Corporation acquired the former MGP property through a merger of LILCO and the Brooklyn Union Gas Company. In 2007, National Grid acquired the former MGP property through the acquisition of KeySpan Corporation.

A more detailed summary of the operating history of the Bay Shore Former MGP Site is included in the remedial investigation reports that have been prepared for the former MGP Site. These reports are titled *Bay Shore/Brightwaters Former Manufactured Gas Plant Site, Remedial Investigation Report, Bay Shore, New York* dated April 2002 (Dvirka and Bartilucci [D&B], 2002) and *Bay Shore/Brightwaters Former Manufactured Gas Plant Site, Final Remedial Investigation Report, Bay Shore, New York* dated January 2003 (D&B, 2003).

1.2.1 Operable Unit No. 4 (OU-4)

As stated above, OU-4 is located approximately 350 feet east of the OU-1 portion of the Bay Shore former MGP Site. During part of its operational history, the Bay Shore former MGP discharged stormwater drainage and treated process wastewater from a skimming basin overflow through a pipe that ran east along Oak Street. This pipe was cut and capped at the former MGP property line in 1999. The pipe initially may have discharged to the former location of Watchogue Creek near the intersection of Oak Street and Center Avenue. Between 1890 and 1909, the creek was filled in and the discharge pipe was routed to two cesspools installed at the former creek location. The cesspools were located near the northwestern corner of the LIRR parking lot adjacent to the northeastern corner of an inactive oil terminal (the former Standard Oil Distribution Station – 22 Oak Street property). The former discharge pipe along Oak Street, the cesspools, and the adjacent impacted soils located between and including Oak Street and the LIRR tracks is herein referred to as the "Cesspool Area."

OU-4 also includes the Pond Area, Watchogue Creek and the Upgradient Cesspool Area (Fig. 1). The OU-4 Pond Area consists of Section 366, Block 4, and Lots 37 and 38 on the TOI Tax Map (1627 Union Boulevard) located south of the LIRR tracks and north of Union Boulevard where a former pond was located. Based on the historic map depictions, it appears that the Pond Area received treated wastewaters from the former MGP Site through the former Watchogue Creek and/or a culvert under the LIRR tracks downgradient of the Cesspool Area. MGP related impacts were also detected in Watchogue Creek downgradient of the Pond area south of Union Boulevard and north of Mechanicville Road. The Upgradient Cesspool Area consists of impacts on 3 Center Avenue detected in January 2008 on the north side of Oak Street while advancing a soil boring for the installation of proposed upgradient monitoring well cluster.

1.3 Summary of Previous Investigations

Several rounds of environmental investigation activities have been completed at the Bay Shore Former MGP Site OU-4 to determine the extent of MGP-related impacts. The results of these investigations are provided in the following reports.

- *Remedial Investigation Report,* prepared by Dvirka and Bartilucci, dated April 2002.
- *Final Remedial Investigation Report*, prepared by Dvirka and Bartilucci, dated January 2003.
- *Pre-Interim Remedial Measure Investigation Report, 22 Oak Street Parcel Adjacent to OU-4 – Cesspool Area, Bay Shore Former MGP Site, Bay Shore New York,* prepared by GEI Consultants, Inc., September 2003.
- *Soil Background Analysis – Statistical Approaches and Application to the Interim Remedial Measure,* prepared by GEI Consultants, Inc., dated January 2005.
- *Bay Shore/Brightwaters Former MGP Site Upgradient OU-4 Cesspool Area Additional Delineation Sampling Results and proposed Remedial Approach,* Letter from National Grid to NYSDEC dated September 28, 2009.
- *Bay Shore Former MGP Site OU-4 Upgradient Cesspool Area Excavation IRM Work Plan and Design Addendum Soil Boring Delineation Results and Proposed Revised Excavation Extent,* Letter from National Grid to NYSDEC dated April 21, 2010.
- *Draft Cesspool Area S-ISCO™ IRM Post S-ISCO™ Soil and Groundwater Data Deliverable*, OU-4 Bay Shore/Brightwaters Former MGP Site, prepared by GEI, dated June 30, 2010.

1.4 Pre-Design Investigation

A pre-design investigation (PDI) scope of work was presented to NYSDEC via email and conditionally approved on April 28, 2022. The scope was developed to further define soil conditions at the limits of the proposed excavation area prior to implementation of IRM excavation activities. The PDI will be completed in two phases for scheduling purposes and to allow for the demolition of the building on the 22 Oak Street property. Phase I was completed prior to demolition of the building and Phase II will be completed following demolition of the building. A figure depicting the PDI investigation area, including the building on the 22 Oak Street, and associated soil sample locations is provided in Fig. 2. Findings of the PDI are discussed in Section 1.9 of this work plan.

1.4.1 Phase I PDI Activities and Findings

Phase I of the PDI included the advancement of soil brings PDI-1 through PDI-6, PDI-8 through PDI-10, PDI-10A, and PDI-10B, and was completed in September 2022. As described in a summary letter submitted to the NYSDEC on November 18, 2022, the Phase I soil borings were advanced to a depth below the deepest observed impacts and soil samples were collected for laboratory analysis of polycyclic aromatic hydrocarbons (PAHs) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) from the first "unimpacted" 1-foot interval immediately below the deepest observed impacts (generally from 12 to 20 feet bgs).

Non-aqueous phase liquid (NAPL)-coated material along with blebs were identified in the driveway area and within the building on the 22 Oak Street property on the eastern side of the planned excavation area, predominantly within the proposed excavation limits. NAPL observed below 15 feet was residual (coating, blebs) and limited to one location. No NAPL-saturated soil was observed.

BTEX compounds were not detected in any soil sample collected during the Phase I PDI. PAHs, including benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and chrysene were detected at concentrations slightly exceeding their respective NYSDEC Part 375 Residential Use Soil Cleanup Objectives (RUSCOs) of 1 mg/Kg at two soil borings. A more detailed description of the PDI findings is provided in Section 1.9.

1.4.2 Phase I PDI Recommendations

As described in the November 18, 2022 Phase I summary letter submitted to the NYSDEC, it is recommended that the cleanup criteria for the IRM excavation be the Part 375 and CP-51 RUSCOs. It was also recommended that the excavation generally be advanced to a maximum depth of 15 feet bgs, consistent with DER-10 section 1.12(b)1, excluding areas where the endpoint and side wall sample results meets the RUSCOs at depths shallower than 15 feet bgs.

Based on review of the Phase I PDI and historical investigation results, the conditionally approved PDI scope of work was implemented to provide a more complete understanding of the vertical and horizontal limits of existing soil impacts at the edges of the proposed IRM excavation area. In addition, as outlined in the November 18, 2022 Phase I summary letter submitted to the NYSDEC several supplementary and/or additional soil borings were recommended to be installed in the northwestern and southeastern portions of the IRM excavation area.

All Phase II PDI sampling and associated field activities will be completed in accordance with NYSDEC's conditionally approved April 28, 2022, PDI scope/rationale email. The Phase II PDI soil samples will be analyzed for BTEX and PAHs, and analytical results will be compared to the RUSCOs. The Phase II of the PDI is anticipated to be completed in 2023, following demolition of the building located at the 22 Oak Street property. In accordance with the NYSDEC February 17, 2023 comment letter regarding the Phase I PDI findings, one additional boring will be advanced during the Phase II PDI. This boring will be advanced to a depth of 30 ft bgs between the location of PDI-9 and PDI-8. In accordance with the NYSDEC August 11, 2023 comment letter regarding the IRM Work Plan, two additional borings will be advanced during the Phase II PDI to the east and south of borings RSB-21 and SB-C2 to further delineate impacts observed at 17.5 ft bgs and 16 ft bgs, respectively.

1.5 Summary of Previous IRMs

The following IRMs have been completed to address the MGP impacts identified in OU-4 as documented in the *OU-4 Cesspool Area and Pond Area Excavation IRM Construction Completion Report*, prepared by GEI Consultants, Inc. dated October 2013 (2013 IRM CCR) and the following reports:

- **2000 – Watchogue Creek/Crum's Brook Restoration IRM**: Surficial impacts identified in Watchogue Creek/Crum's Brook south of the Pond Area, between Union Boulevard and Mechanicville Road, were remediated and restoration was completed in 2000. The details of this IRM and the restoration are provided in the *Final Summary Report for Crum's Brook Restoration, Area C Interim Remedial Measure*, prepared by Foster Wheeler, dated November 2002, and the *OU-4 Watchogue Creek/Crum's Brook Post Interim Remedial Measures Analytical Results and Final Conditions Report,* Letter from National Grid to NYSDEC dated September 7, 2012.

- **2005 – OU-4 Cesspool Excavation IRM**: The removal of significant sources of MGP-related impacts in the vicinity of the former cesspool and associated structures on the 22 Oak Street and TOI properties and the discharge pipe that ran along Oak Street from 5th Avenue was completed in November 2005. The depth of this excavation ranged from 4 to 6.5 ft bgs.

- **2009 – OU-4 Surfactant-Enhanced In-Situ Chemical Oxidation (S-ISCO) Application**: S-ISCO injections were implemented in 2009 to address the deeper and inaccessible residual impacts remaining in the Cesspool Area. The S-ISCO application was performed in accordance with the *Surfactant-Enhanced In-Situ Chemical Oxidation (S-ISCO™) OU-4 Cesspool Area Work Plan (S-ISCO™ Work Plan)*, dated February 2008, prepared by VeruTEK Technologies, Inc. and the associated addendums. The injections were performed from April through

December 2009. Post S-ISCO soil and groundwater sampling was performed in the spring of 2010 to evaluate the effectiveness of the S-ISCO treatment. The results of the post S-ISCO soil and groundwater sampling in OU-4 are provided in the *Draft Cesspool Area S-ISCO IRM Post S-ISCO Soil and Groundwater Data Deliverable, OU-4 Bay Shore/Brightwaters Former MGP Site,* prepared by GEI, dated June 30, 2010. A summary of the work performed during the S-ISCO IRM is provided in the *S-ISCO™ Injection Summary Report OU-4 Bay Shore/Brightwaters Former MGP Site,* prepared by XDD LLC, dated June 2012.

- **2011 – OU-4 Cesspool Area and Pond Area Excavation IRM**: Subsequent to the post S-ISCO soil and groundwater sampling, the NYSDEC, in a letter dated November 4, 2010, directed National Grid to excavate areas where MGP-related source material impacts still exists to a depth of 10 ft bgs in the Cesspool Area in order to reduce the risk for direct human exposure to MGP-related source material impacted soils during future subsurface utility work. This IRM was expanded to include the removal of impacts in the OU-4 Upgradient Cesspool Area to meet Unrestricted Use soil clean up objectives (SCOs) and to remove impacts in the OU-4 Pond Area to meet Restricted Residential Use SCOs. Over 15,000 tons of soil was excavated and transported off-site for treatment and disposal.

1.6 General Site Geology

The shallow stratigraphy beneath the Site is fill, glacial outwash deposits, and the Magothy Formation, in descending order. The fill thickness ranges from about two to six feet and consists primarily of sand and gravel with some urban debris.

The glacial outwash deposits vary in thickness from about 65 to 70 feet. These deposits consist of yellow-brown to orange, medium to coarse sand with small amounts of silt and fine to coarse gravel. Gravel lenses were encountered primarily within 20 ft bgs.

The Magothy Formation consists of light gray to black fine sand, silt, and clay ranging from hard to slightly plastic in texture. This formation is not expected to be encountered during these IRM activities because the formation is 71 to 74 ft bgs (-52 to -55 feet above mean sea level [ft msl]), and the proposed excavations are less than 20 feet in depth.

1.7 Hydrogeology

The average depth to groundwater ranges from two to six ft bgs in the Cesspool Area. Groundwater at the Site flows to the south-southeast. Based on the water level data collected during the Remedial Investigation (RI) in 2002, there is a slight upward gradient in the vertical head distribution between the deep and shallow monitoring well clusters WCMW-01 and WCMW-02. The deep wells have greater static heads than the shallow wells with differences of 0.07 and 0.06 feet, respectively, indicating a possible area of groundwater discharge.

1.8 Extent of Groundwater Impacts

Quarterly groundwater sampling has been performed at the Site beginning in 2002 and is on-going. The existing Site groundwater monitoring well locations are provided on Fig. 2.

The highest level of groundwater impacts remaining in OU-4 have been detected on the 22 Oak Street property in shallow well WCMW-29S located beneath the eastern portion of the building. The wells located on the 22 Oak Street property were last sampled in the second quarter of 2022. WCMW-26S and WCMW-29S, which also has had historically elevated concentrations, were installed after S-ISCO injection was complete and are located outside of the excavation area on the 22 Oak Street property. Remaining groundwater impacts in OU-4 also include low levels of PAHs in intermediate wells located in the western portion of the TOI LIRR parking lot at WCMW-05I and WCMW-30I and in upgradient shallow well WCMW-30S.

Groundwater monitoring results for the former MGP Site are currently presented to the NYSDEC on a quarterly basis and interpreted for distribution on an annual basis. The most recent annual report is the *2021/2022 Annual Groundwater Monitoring and Operations, Maintenance and Monitoring Report, Bay Shore/Brightwaters Former MGP Site*, GEI Consultants, Inc., P.C., dated December 2022.

Additional groundwater monitoring of select monitoring wells on the 22 Oak Street property will be completed as part of PDI activities.

1.9 Extent of Soil Impacts

Two site-specific Standards, Criteria, and Guidance (SCGs) were previously applied to the soils in the upper 10 feet of material in the Cesspool Area. The first site-specific criteria is the removal of MGP-related source material impacts in the upper 10 feet in the Cesspool Area, as established by the NYSDEC November 4, 2010 letter. The second site-specific SCG for the upper 10 feet of soil is CP-51 Subsection V.H. – *Subsurface Soil Cleanup for Total PAHs*, specifying a maximum total PAH concentration in subsurface soil of 500 milligram per kilogram (mg/kg). Soil impacts remaining after the 2011 excavation IRM are described in the 2013 IRM CCR. The analytical data for soil samples collected within the Cesspool Area outside of the extent of the 2011 excavation is provided in Appendix A. The soil analytical data for samples collected on the 22 Oak Street property during the 2003 investigation and the PDI are also provided in Appendix A.

The soil remaining on Site with impacts greater than the 500 mg/kg CP-51 criteria is primarily located beneath the 2011 IRM excavation footprint. A demarcation barrier was placed at the bottom of the excavation within the Cesspool Area prior to backfill. The location of the demarcation barrier is consistent with the bottom of the excavation identified on the As-Built construction drawings provided in the 2013 IRM CCR and as shown on Fig. 2. No total PAH impacts above 500 mg/kg were identified during Phase 1 of the PDI.

The remaining impacts beneath and adjacent to the building located on 22 Oak Street were identified in post S-ISCO soil borings SB-B2, SB-C2, SB-D3 and soil boring performed during the 2003 22 Oak Street investigation (RSB-14, RSB-15, RSB-28). The 2003 soil borings were performed prior to the 2009 S-ISCO injection in this area, therefore, the impacts observed in 2003 are provided for reference but the 2010 post-S-ISCO boring logs along with the 2022 Phase I PDI boring logs more accurately represent current Site conditions. The soil boring locations are provided on Fig. 2. The findings summarized below were used to develop the planned limits of excavation shown on Fig. 3. The soil boring logs are provided in Appendix B. The impacts identified at these locations are summarized below:

<u>2003 and 2009 Investigations</u>

- SB-B2 (2010): Staining and sheen with intervals of MGP-related source material-coated soils from 4 to 12.25 ft-bgs.
- SB-C2 (2010): Staining and sheen with intervals of MGP-related source material-coated soils from 6 to 16.25 ft-bgs, heaviest impacts from 10 to 12.5 ft-bgs.
- SB-D3 (2010): Lens of MGP-related impacts at 6.75 ft-bgs, heavy MGP-related impacts from 11 to 11.5 ft-bgs.
- RSB-14(2003): Staining and sheen with intervals of MGP-related source material-coated soils from 6 to 18.5 ft-bgs.
- RSB-15 (2003): Lens of MGP-related source material at 14 ft-bgs and heavy MGP-related staining from 16 to 17 ft-bgs.
- RSB-28 (2003): Lens of MGP-related source material-saturation at 10 ft-bgs and 14.7 ft-bgs.

MGP-related impacts were not detected in soil borings SB-F1, SB-G3, or RSB-20. The MGP-related impacts detected in soil borings SB-F2, RSB-16, and RSB-30 located outside of the 2011 excavation extent and south of the building on 22 Oak Street are limited to isolated MGP-related source material lenses at depths below 12 ft-bgs. The shallowest MGP-related impact detected at these locations was identified in SB-F2 with a lens of MGP-related source material at approximately 12.25 ft-bgs.

Soil samples collected outside of the proposed excavation extents on the 22 Oak Street property generally meet the Restricted Residential criteria shallower than 12 feet bgs. A soil sample collected from RSB-11 from a depth of 2 to 4 feet bgs, located south of the 22 Oak Street building, exhibited low levels of PAHs that exceed the Restricted Residential criteria. There were no indications of MGP-related impacts in adjacent soil borings SB-G3 and RSB-31 or beneath 4 ft-bgs at this location.

<u>2022 Phase I PDI</u>

MGP-related impacts were noted in each of the borings advanced during the PDI excluding one location (PDI-10B). Excluding the borings listed below with residual MGP-impacts, the impacts in the remaining borings were limited to odors and/or photoionization detector (PID) readings above background, which are likely the result of impacted groundwater.

Lenses of NAPL-coated material with blebs were noted in the following borings and approximate intervals:

- PDI-4: 10 to 11 ft-bgs.
- PDI-5: 8 to 10 ft-bgs.
- PDI-6: 5 to 10 ft-bgs.
- PDI-8: 15 to 19 ft-bgs.

Three of the four locations identified above were in the driveway area (PDI-4, PDI-5, and PDI-6) and the fourth (PDI-8) was beneath the northeastern portion of building on the 22 Oak Street property. All of which are within the proposed excavation limits. NAPL observed below 15 feet at PDI-8 was residual and immobile and should not represent a source. Elevated PID readings (up to 29.6 parts per million [ppm] at PDI-8) and slight to strong naphthalene-like odors were identified at and below 15 feet bgs at most soil borings, with the exception of soil borings PDI-4, PDI-10, PDI-10A, PDI-10B.

Phase I PDI soil samples were collected below any observed impacts to identify the vertical limit of impacts. BTEX compounds were not detected in any soil samples collected during the Phase I PDI. PAHs were detected at concentrations slightly exceeding their respective RUSCOs of 1 mg/Kg at two soil borings, as follows:

- PDI-4 (15 to 16 feet bgs), collected in the northeastern portion of the PDI excavation area, exhibited slight exceedances of four PAHs: benzo(a)anthracene (2.5 mg/Kg), benzo(b)fluoranthene (1.1 mg/Kg), benzo(a)pyrene (1.4 mg/Kg), and chrysene (2.5 mg/Kg).

- PDI-9 (19 to 20 feet bgs), collected in the central-eastern portion of the PDI excavation area, exhibited slight exceedances of two PAHs: benzo(a)anthracene (1.5 mg/Kg), and chrysene (1.4 mg/Kg).

1.10 Project Organizational Structure and Responsibility

National Grid will coordinate with the property owner, NYSDEC, New York State Department of Health (NYSDOH), and other local regulatory agencies to conduct the IRM at the Site. Approval of this Work Plan by NYSDEC will be obtained prior to contractor mobilization. It is anticipated that NYSDEC will have a representative at the Site periodically during implementation of the IRM.

The Contractor, under contract to National Grid, will be responsible for all IRM construction activities. The IRM will be performed as defined in the Contract Documents, which will include the IRM Work Plan, terms and conditions, drawings, specifications, and any approved change orders.

National Grid will have final responsibility and authority for all remedial construction aspects of the IRM activities. National Grid is responsible for enforcement of the terms and conditions of the Contract Documents and negotiating and approving any change orders, if necessary. A National Grid representative will be on site throughout the IRM activities. GEI will serve as the Engineer/Construction Manager (CM) and will act as National Grid's representative. National Grid will be responsible for all communication with regulatory agencies, members of the surrounding community and the press.

The Contractor, under contract to National Grid, will be responsible for all construction activities including, but not limited to, compliance with all applicable Occupational Safety and Health Administration (OSHA) health and safety regulations, construction personnel health and safety, implementation of odor control measures (as necessary), traffic control, site security, excavation, material handling, transportation and disposal activities associated with the IRM, and any other specified tasks outlined in this Work Plan or the Contract Documents.

GEI, under contract to National Grid, will serve as the Engineer of Record for the IRM and the CM. GEI will be responsible for engineering oversight of the remedial components and oversight of the Contractor to ensure compliance with Contract Documents for the purposes of certifying the IRM CCR. GEI will represent National Grid as the Engineer/CM to ensure the IRM construction activities are conducted in conformance with the project specific Contract Documents and Site-specific community requirements. The Engineer/CM will act as National Grid's representative on Site and be responsible for managing all Site activities, maintenance of Site sampling logs, meteorological logs, and Contractor invoice and change order review on behalf of National Grid. This will include providing day-to-day field oversight of IRM construction activities to ensure technical compliance with the design documents and conformance with all relevant portions of NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation and the Draft Site Management Plan (SMP). National Grid will be responsible for communications with NYSDEC and NYSDOH, and other project stakeholders, including the property owner, adjacent property owners, other members of the community, and city government officials. The Engineer/CM will assist National Grid in the review of technical specifications, remedial contractor proposals and contractor remedial design submittals. GEI will also be responsible for implementing the Community Air Monitoring Plan (CAMP) and vibration monitoring.

Representatives of NYSDEC will be invited to attend all regular job progress meetings, including pre-construction meetings.

The following are the key personnel or agencies involved with IRM activities at the Site:

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2. Remedial Action Goal and Objectives

2.1 Remedial Action Goal

The NYSDEC remedial program identifies the goal for site remediation under 6 NYCRR Sub-Part 375-2.8(a) as:

> "…restore that site to pre-disposal conditions, to the extent feasible. At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles and in a manner not inconsistent with the national oil and hazardous substances pollution contingency plan as set forth in section 105 of CERCLA [Comprehensive Environmental Response, Compensation and Liability Act], as amended as by SARA [Superfund Amendments and Reauthorization Act]."

Where restoration to pre-disposal conditions is not feasible, the NYSDEC may approve an alternative criterion based on the Site conditions (6 NYCRR Sub-Part 375-2-8[b][1]). This could include the application of one of the SCOs listed in Table 375-6.8(a) (Unrestricted Use) or Table 375-6.8(b) (Restricted Use). Alternatively, the responsible party may "propose site-specific soil cleanup objectives which are protective of public health and the environment based upon other information."

The remedial goal for the Cesspool Area was defined by the NYSDEC in the November 4, 2010 NYSDEC letter. NYSDEC determined that the soil impacts within the upper 10 feet of material represented a potential future risk for direct human exposure during future underground utility work and should be removed where accessible. Note in this IRM the excavation will go to an anticipated depth of 15 feet bgs with two limited areas of excavation; one to 19 ft bgs centered on boring PDI-8 and one to 18 ft bgs centered on borings RSB-21 and SB-C2.

As defined in DER-10 SCGs are the New York State regulations or statutes that dictate the cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations that are generally applicable, consistently applied, officially promulgated, and are directly applicable to a remedial action.

The SCGs that apply to this Site are:

- 6 NYCRR Subpart 375-1: General Remedial Program Requirements
- 6 NYCRR§ 375-2: Inactive Hazardous Waste Disposal Site Remedial Program

- 6 NYCRR§ 375-6: Remedial Program SCOs
- Guidance for Evaluating Soil Vapor Intrusion in New York
- DER-10 Technical Guidance for Site Investigation and Remediation
- DER-31 Green Remediation
- NYSDEC CP-51 Soil Cleanup Guidance (CP-51)
- New York State Ambient Water Quality Standards

Site-specific cleanup levels soil at the Site are the SCGs that will be used to define the Remedial Action Objectives (RAOs) and to develop the remedial alternatives. The proposed future Site use for the 22 Oak Street property is a multi-story residential apartment building with commercial space and parking on the ground level. The RUSCOs were applied to the 22 Oak Street portion of OU-4 based on the anticipated future site use.

Similarly, the remedial goals for the IRM (OU-4 Cesspool Area, 22 Oak Street property) described herein will be to remove MGP-impacted material via excavation consistent with the RUSCOs.

2.2 Remedial Action Objectives

RAOs are medium-specific or operable-unit specific objectives for the protection of human health and the environment. The media of concern for the Site are soil and groundwater. The medium-specific RAOs for the Site are:

Soil

- Prevent, to the extent practicable, ingestion and direct contact with MGP-impacted soils.
- Prevent, to the extent practicable, migration of impacts that would result in groundwater or surface water impacts.
- Prevent inhalation of contaminants volatilizing from impacted soil.

Groundwater

- Prevent, to the extent practicable, ingestion and direct contact with MGP-impacted groundwater.
- Prevent inhalation of impacts volatilizing from impacted groundwater.

3. IRM Summary

The proposed IRM includes excavation, removal, and off-site disposal of MGP-impacted subsurface soils within and adjacent to a portion of the 22 Oak Street building footprint.

The proposed lateral extent of excavation is provided in Fig. 3. The final extent of the excavation will be determined following the implementation of Phase 2 of the PDI and potentially the redevelopment plans. The lateral extent of excavation will remove MGP-related impacts including soils in exceedance of the RUSCOs at depths up to 15 ft-bgs.

The eastern extent of excavation extends two feet east of the western extent of the 2011 excavation to provide overlap to ensure previously inaccessible impacts adjacent to the building on 22 Oak Street are removed. This will include a small area on the TOI property immediately west of the building. The highest groundwater impacts remaining in OU-4 are in shallow well WCMW-29S located beneath the current 22 Oak Street building. Other wells in the area that have had historically elevated concentrations include shallow well WCMW-26S and in intermediate WCMW-30I located immediately behind and immediately east of the 22 Oak Street property, respectively. The shallow wells are screened from 2 to 12 ft-bgs and the intermediate well is screened from 20 to 25 ft-bgs. Excavation of these impacts should also significantly reduce remaining groundwater impacts within OU-4.

More detailed information regarding the implementation of the IRM is provided in the IRM Technical Specifications and Drawings (**Appendix C**).

The removal of subsurface soil impacts will meet the area specific RAOs for soil in Section 2.2. The removal of the subsurface soils will meet the RAOs by removing MGP-impacted soils and preventing direct contact with remaining impacted materials.

This IRM Work Plan assumes at a minimum that the property owner will complete demolition of the existing building and that National Grid will have access to the 22 Oak Street property as required to complete the IRM. Access to the TOI property will also be required based on the proposed excavation extent.

3.1 Execution of the IRM

The IRM includes the excavation, removal, and off-site disposal of MGP-related impacted materials.

Site work will commence at 0700 Monday through Friday with no heavy truck traffic or heavy equipment use until 0800. All work must be completed, and the Site secured for the evening at 1700, unless otherwise authorized by National Grid and other stakeholders.

During working hours, the Contractor will make every effort to minimize impacts (including, but not limited to, noise and traffic) to the community. Site work will not be conducted on weekends without prior approval from and coordination by National Grid.

The IRM will be executed in one phase. Site features will be restored to pre-IRM conditions or to the conditions required by the property owner for the subsequent redevelopment, both at the surface and subsurface. The final grade will be restored as depicted in the design documents. Final restoration requirements will be finalized as part of the access or licensing agreements with property owners and/or local officials are executed.

3.2 Mobilization and Site Access

Prior to mobilization, the Contractor will prepare and submit all required documents identified in the Contract Documents for review and approval by National Grid, the Engineer, and the NYSDEC. The Engineer will review final Contractor submittals to ensure conformance with the Contract Documents.

The Contractor will apply for and obtain all necessary Federal, State, and local permits associated with the IRM work plan. These permits may include, but are not limited to, traffic routing, construction, air emissions, noise, etc.

The Contractor will contact New York 811 to request that all utilities on the Site are located and marked in accordance with Code Rule 753. The Contractor will contract a private utility locator service to identify any utilities on private properties. Any underground utility protection and/or relocation will be the responsibility of the Contractor prior to mobilization or during implementation of the IRM.

The Engineer/CM will conduct a pre-construction Site meeting, after the project is awarded, with the Contractor, National Grid, and NYSDEC prior to the commencement of IRM implementation. The meeting will be conducted to review specified construction requirements and schedules, as well as to review the responsibilities of the Contractor, the Engineer/CM, and National Grid with respect to the IRM implementation.

Prior to the IRM, a New York State-licensed surveyor will establish control points and benchmarks in English Units (feet) using the following:

- Horizontal Datum: New York State Plane Coordinate System Long Island 3104.
- Vertical Datum: North American Vertical Datum 1988, NAVD88.

During the IRM, the surveyor will layout work and survey record information such as the limits of the excavations. Other Site personnel may perform layout work as needed. The Contractor will mobilize all necessary labor, equipment, supplies, and materials to complete the IRM upon approval by National Grid. An exclusion zone(s) (EZ), contamination reduction zone(s) (CRZ) and support zone(s) (SZ) will be established to conduct the planned activities safely.

3.3 Site Preparation

The property owner will complete the demolition of the existing building prior to the start of the IRM. This will include the demolition of all above ground building elements, the disconnection of all utilities and the removal of all associated debris from the Site by the property owner prior to the remedial contractor's mobilization. The remedial contractor will remove the foundation elements as part of the IRM work scope.

The Contractor will be responsible for preparing the Site for the IRM. Site preparation activities necessary to provide support for the work, include the establishment of work zones, support facilities, decontamination facilities, erosion control measures, and installation of temporary security fencing around the work area and roll-off box staging area (for debris).

The Contractor will be responsible for removing/protecting existing trees, fences, and structures/ appurtenances agreed upon by property owner in advance of the IRM.

Soil erosion and sediment control measures will be installed prior to excavation and maintained throughout the project in accordance with the Erosion and Sediment Control Plan in Section 6, and the Contract Documents.

Existing groundwater monitoring wells WMCW-11S, 11I, 11D, 22S, 22I, 23S, 23I, 26S, 26I, 29S and 29I will be abandoned in accordance with the NYSDEC Technical Guidance CP43: Groundwater Monitoring Well Decommissioning Policy, dated November 3, 2009 (CP43) and the Contract Documents. Other existing downgradient wells for groundwater monitoring purposes can be sampled following the excavation IRM. These include WCMW-14S, I and D).

The majority of the Site is currently enclosed by security fencing and a concrete block wall. Following completion of the demolition, the Contractor will install a security fence with two access gates to be erected to enclose and control access to the construction site for the duration of the IRM where existing fencing/walls are not sufficient. The Site Security Plan, Section 6, indicates the location and installation of the temporary fence.

Following preparation of the Site, a decontamination/anti-traction pad will be constructed at the entrance to the work area. The Decontamination Plan included in Section 7, details the placement and operation of the decontamination/anti-traction pad.

3.4 Excavation

The purpose of the excavation is to remove soils containing MGP-related impacts or exceedances of the RUSCOs to a depth of 15 ft bgs with a limited area of excavation to 19 ft bgs centered on boring PDI-8. Note in this IRM the excavation will go to an anticipated depth of 15 feet bgs with two limited areas of excavation; one to 19 ft bgs centered on boring PDI-8 and one to 18 ft bgs centered on borings RSB-21 and SB-C2.

Prior to excavation, the Contractor will be required to obtain approval from a primary and an alternate, licensed National Grid-approved treatment/disposal facility for all excavated material.

3.4.1 Excavation Limits

The excavation limits for the Cesspool Area include a portion of the footprint of and adjacent to the 22 Oak Street structure to a depth of 15 ft bgs, as shown in Fig. 3. In accordance with the NYSDEC February 17, 2023, comment letter regarding the Phase I PDI findings, an area of approximately 100 square feet will be excavated to a depth of 19 ft bgs centered on boring PDI-8. In accordance with the NYSDEC July 11, 2023, comment letter on the draft IRM Work Plan, an area of approximately 100 square feet will be excavated to a depth of 18 ft bgs centered on borings RSB21 and SB-C2. The proposed excavation limits were delineated using a compilation of visual impact observations and soil analytical data as described in Sections 1.8 and 3 above. The eastern extent of excavation is specified to extend two feet east of the western extent of the 2011 excavation, which includes a small area on the TOI property immediately west of the building. As stated above, the final excavation limits will be determined following the implementation of Phase 2 of the PDI and in conjunction with the property development. Additional borings will be conducted in the following areas following demolition of the building and before IRM construction.

- One boring located between PDI-8 and PDI-9.
- One boring east of SB-02.
- One boring south of RSB201 and SB-C2 and north of PDI-9

The excavation will extend below the water table and the Contractor will be required to excavate soil in the wet. Material handling will be performed in accordance with Section 3.4.5. The final grade of the Site will be restored to a level surface, further described in the Contract Documents, and pending instruction from the property owner.

Once the remedial contractor reaches the target depth of the excavation, the Engineer/CM will examine the material brought to the surface to document any observations of impacted materials. If evidence of source material as defined in 6 NYCRR Part 375-1.2(au) is present, then the contractor will be required to excavate up to 2 feet below the target excavation. Source material observations requiring additional excavation will include the following:

- Evidence of MGP-related NAPL.
- Grossly contaminated media.

Note that evidence of sheen or odors alone will not constitute source material requiring additional excavation as the water in the excavation will be in contact with impacted soils excavated during the IRM and the transfer of sheens and odors is anticipated as the excavator bucket moves through the groundwater.

Note that observations of non-MGP impacts outside of the excavation limits will not be included in this IRM.

The remedial contractor will have materials on-hand during excavation activities to remove sheens from the surface of the groundwater within the excavation. This may include sorbent pads, booms, or other materials designed to remove petroleum impacts from the groundwater.

3.4.2 Earth Support System

A temporary earth support structure will be required to reach the target depths identified in the area of the excavation. Groundwater is as shallow as two to six ft bgs in the Cesspool Area. Depending on the seasonal fluctuation of the water table, excavations may extend six to ten feet below the water table.

Upon completion of the excavation and backfilling, the temporary excavation support systems will be removed. The Engineer/CM will examine the exterior of the excavation support system once it is removed to document any observations of impacted materials on the exterior of the system components. If evidence of source material as defined in 6 NYCRR Part 375-1.2(au) is present, then additional excavation beyond the planned limits may be required.

3.4.3 Backfill

The excavated areas will be backfilled with material in conformance with the Contract Documents and the Site owner. A visual demarcation barrier will be placed at the bottom of the excavation areas prior to backfill where impacts remain below the excavation depth. Prior to placement of backfill above the groundwater table, any visible NAPL within the excavation will be removed by methods approved by the Engineer. All backfill materials will be obtained from either clean sources approved by the New York State Department of Transportation (NYSDOT) or other National Grid approved sources. Representative confirmatory samples will be collected from each off-site source of backfill material prior to its use and approved by NYSDEC in accordance with the Draft Site Management Plan.

Representative confirmatory samples will be collected from each off-site source of backfill material prior to its use and approved by NYSDEC in accordance with the Draft Site Management Plan. Sampling of imported fill will be completed at a frequency in accordance with DER-10. Samples will be analyzed for

- Pesticides.
- Target Analyte List Metals,.
- PCBs by EPA Method 8082.
- PFAS by draft EPA Method 1633.
- VOCs by EPA Method 8260B or NYSASP Method 95.1.
- SVOCs and 1,4 -dioxane by EPA Method 8270C or NYSASP Method 95-2.

Imported fill must meet the RUSCOs as listed in DER-10, Appendix 5.

3.4.4 Material Handling

All soils excavated will be transported to the stockpile area for mixing or amendment, if necessary. Saturated soil will be allowed to drain back into the excavation prior to transport to the stockpile area. Within the stockpile area dryer soils or NYSDEC-approved drying agent may be used to mix with or amend the wet soils until soils meet the disposal facility parameters for moisture content. Impacted soils will be transported off site for treatment and disposal at an appropriately permitted treatment/disposal facility approved by National Grid.

Saturated soils will be allowed to further drain within the stockpile area prior to mixing or amendment. The water will be collected within the stockpile area and pumped into a fractionation (frac) tank. Disposal of the wastewater will be handled in accordance with the Waste Management Plan (Section 8).

It is anticipated that the soil will be pre-characterized by the Engineer as part of Phase 2 of the PDI to allow load out of excavated material stockpiles for transport and disposal once the required moisture content is achieved. This data will be provided to the Contractor for use in obtaining approval from the selected NYSDEC and National Grid-approved disposal facilities.

Once a truck is filled with excavated material for transport off site, spray-on odor suppressing materials such as Rusmar™ foam may be used to reduce potential odors or volatile organic compounds (VOCs) emissions during transit, if necessary. A solid truck tarp will then cover the truck bed and be secured on all sides. The truck will then exit the material handling area and proceed immediately to a decontamination pad. Following decontamination, the truck will proceed directly to the designated disposal facility. All trucks will have watertight compartments and liners to prevent wet soil from leaking onto public streets.

Based on the investigation data, it is anticipated that excavated material will be transported as non-hazardous material. If necessary, suspect materials encountered during excavation that may exhibit hazardous characteristics will be segregated, stored on site, sampled, characterized, and disposed of appropriately.

3.4.5 Odor and Fugitive Dust Control

Details about odor and fugitive dust control management are presented in Section 4.

Conditions within the excavation area will be monitored in accordance with the Contractor Health and Safety Plan (HASP). Conditions at the perimeter will be monitored in accordance with the CAMP throughout the excavation phase.

3.4.6 Vibration Monitoring

A vibration monitoring plan will be prepared and submitted under separate cover.

3.5 Construction Oversight

The Engineer/CM will be on Site during all IRM activities. The Engineer/CM will be responsible for remediation oversight and conformance with the Contract Documents. Specific responsibilities of the CM, Engineer, Contractor, and National Grid are discussed in Section 1.8.

Representatives of the NYSDEC and NYSDOH may be present during construction and restoration activities.

3.6 Site Restoration

Site restoration will consist of backfilling the excavation to the grades and specifications provided by the property owner to support the overall redevelopment of the Site. More detailed information regarding Site restoration of the IRM will be provided in the Contract Documents.

4. Vapor/Odor Management

Excavation activities at remediation sites may generate airborne dust and vapors (i.e., VOCs) that have the potential to migrate off site. In recognition of this potential hazard, the NYSDOH has promulgated a CAMP that establishes action levels of respirable dust and VOCs that are protective of the surrounding community. The requirements of the CAMP are contained in Appendix 1A of the May 3, 2010 DER-10 Technical Guidance for the Site Investigations and Remediation. The CAMP is intended to supplement but be discrete from the air-monitoring program implemented by the Contractor for purposes of evaluating site worker health and safety.

4.1 CAMP Summary

A site-specific CAMP has been prepared for the Site and is included in Appendix D. The CAMP is designed to provide monitoring procedures, Alert Limits, Action Limits, and contingency measures if Action Limits are approached. An Alert Limit is a contaminant concentration or odor intensity that triggers contingency measures. An Alert Limit does not suggest the existence of a health hazard but serves instead as a screening tool to trigger contingency measures if necessary, to assist in minimizing off-site transport of contaminants and odors during remedial activities. An Action Limit is a contaminant concentration or odor intensity that triggers work stoppage.

During intrusive ground activities, fence line perimeter air monitoring will be conducted using a combination of real-time (continuous and almost instantaneous) air monitoring at fixed locations and walk-around supplemental monitoring using hand-held instruments on an as-needed basis. Contaminants commonly found at former MGP sites will be monitored, including VOCs and dust. The CAMP includes a Contingency Plan that defines Alert Levels, Action Levels, and specific response activities to be implemented during working hours if an exceedance of an Alert Limit or Action Limit for a measured compound occurs. The response actions, potentially including work stoppage, are intended to prevent or significantly reduce the migration of airborne contaminants from the Site.

If the real-time perimeter Action Limits are exceeded or significant nuisance odors are noted, National Grid, the Engineer, and the Contractor will consult to determine what type of emission control action is appropriate. Actions that may be taken to reduce emissions include the following:

- Spraying water on exposed soil surfaces and/or roadways to suppress windblown dust.

- Covering working areas of exposed impacted soils, trucks loaded with impacts soils, or stockpiles of impacted soils with tarpaulins, vapor suppressing foam, or other vapor control agents.

- Relocating work to an area with potentially lower emission levels.

- Reducing the excavation production rate.

- Changing the sequence of work activities.

- Changing methods or equipment to alternatives that minimize air emissions.

In practice, these actions will typically be employed proactively to prevent action levels from being reached at the EZ perimeter in the first instance. These above-mentioned Alert and Action Level Concentrations are included in the CAMP (Appendix D) and will be summarized in the Contract Documents. The anticipated locations of the air monitoring stations are also noted, subject to change according to the Contractor's means and methods.

4.2 Fugitive Dust Control

Construction activities will be performed to limit the potential for fugitive dust emissions. Dust control measures will be implemented to minimize the potential for dust generation during soil excavation and handling, and placement of fill. The Contractor will provide materials to act as a dust suppressant. This may include tarps and/or water, or other National Grid-approved methods. The Contractor will keep sufficient dust suppressant materials on site to suppress fugitive dust from the excavation. The material will be stored near the excavation and will be easily mobile in case of need.

Heavily traveled truck routes within the EZ and SZ will be inspected continuously during high traffic periods for excessive dirt or dust and will be wet down to minimize dust emissions. A decontamination pad large enough to accommodate equipment and trucks will be constructed at the Site exit to clean tires of all vehicles exiting the Site.

Cleaning of trucks exiting the EZ will eliminate dusty conditions on adjacent roadways. Transport trucks exiting the EZ will pass through an inspection area and/or be inspected to ensure tires and undercarriages are clean and that tarps are secured. Excessive mud and loose dirt observed on the trucks will be manually removed with brooms and brushes and/or water, as necessary.

The contractor is responsible for ensuring the public streets, shall be free of dirt, dust, impacted materials, or other building/construction materials associated with the IRM work. If such materials are deposited, spilled, leaked, or spread on off-site roadway, the contractor is responsible for immediate removal of such material and will have equipment capable of cleaning public streets on-site and ready for use.

4.3 Odor Control

Construction activities will be performed in such a manner that limits the potential for nuisance odor emissions. Odor control measures will include the use of odor suppressant foams or solvents. The Contractor will provide materials to act as an odor suppressant. This may include chemical foam (e.g., Rusmar Foam), chemical solvents (e.g., BioSolve®) or other industry standard methods. The Contractor will keep sufficient odor suppressant materials on-site to suppress nuisance odors from open excavations, stockpiles, roll-off, containers, or material transport vehicles. The Rusmar Foam machine, or equivalent, will be readily available for use at the excavation and soil staging/stockpile areas at all times. The Contractor will apply odor-suppressing foam to the excavated materials when stockpiled, during excavation, amendment, and loading operations, or at any other time and location as directed by National Grid or NYSDEC to mitigate nuisance odors.

Following excavation the soil will be placed to allow it to drain back into the excavation prior to adding it the main stockpile. The draining of impacted groundwater should aid in odor control. All open excavations containing MGP-related source material will be backfilled or covered at the end of each working day to suppress odors.

5. Erosion and Sediment Control Plan

The erosion and sediment controls are intended to mitigate erosion and sedimentation from the Site, further described in the Contract Documents.

5.1 Description of Construction Activities

The project involves the excavation of approximately 3,000 cubic yards of soils which do not meet the RAOs stated in Section 2.2. The majority of the excavation will be to a maximum of 15 ft bgs with two deeper excavations. One deeper excavation will be conducted to 19 ft bgs centered on boring PDI-8 and a second deeper excavation will be conducted to 18 ft bgs centered on borings RSB-21 and SB-C2 . The average groundwater depth is about 2 to 6 ft bgs.

5.2 Potential Areas for Erosion and Sedimentation

The 22 Oak Street property is relatively flat and located on the south side of Oak Street. Oak Street drains towards the west-southwest to a system of catch basins on either side of the street. The 22 Oak Street property is sparsely vegetated, primarily covered in concrete pavement and the existing building. Surface drainage on the property generally drains towards Oak Street.

5.3 Implementation of Erosion Control Measures

Sediment fence will be installed around the entire perimeter of the exclusion zones and all areas to be excavated in accordance with the Contract Documents. Sediment fence and hay bales will be installed around all catch basin structures within the exclusion zones. Decontamination stations will act as anti-tracking pads, thereby removing soil and sediment from all trucks/equipment wheels and bodies that are exiting the Site. All trucks will have watertight compartments to prevent wet soil from leaking onto public streets.

The Contractor will install and maintain the erosion control measures indicated in the Contract Documents for the duration of the excavation and backfilling. Additional erosion control measures may be needed due to unforeseen conditions. The Contractor shall install additional measures as necessary and as directed by National Grid.

To minimize erosion potential from stormwater, all stormwater runoff from the exterior of the excavation area will be collected, routed, and discharged into the local storm drainage system prior to contact with any impacted materials.

5.4 Restoration

Upon completion of the remediation activities, the Contractor will remove all sediment fencing, hay bales, and restore the surface to pre-IRM conditions or to the conditions required by the property owner for the subsequent redevelopment. All sediment accumulated in the fencing will be removed and transported to a properly licensed National Grid-approved disposal facility.

6. Security Plan

The objectives of the security plan are to limit access to the Site, as well as prevent vandalism/ destruction of construction equipment, and minimize health and safety concerns for the surrounding residential neighborhood.

6.1 Perimeter Security

A temporary fence will be erected around the perimeter of the IRM work area in accordance with the Contract Documents. At a minimum, the chain-link fence will be 8 feet high and equipped with a privacy screen. The fence will encompass all work areas to include the excavation area, waste handling equipment, and storage areas, if any. Existing fencing and concrete block walls will be utilized to construct the perimeter fence, where available. At a minimum, two gates will be provided for routine and emergency access. The gates will be locked at the end of each workday. If gates are not lighted (i.e., building floodlights, municipal streetlights, etc.), the Contractor will provide temporary lighting at the gate.

6.2 Equipment Security

All vehicles and/or equipment left on the Site must be secured at the end of each working day. Vehicles and equipment will remain inside the perimeter fence or at a remote secured area overnight and during non-workdays. No vehicles or equipment may be left overnight in an unsecured location. It is the responsibility of the Contractor to ensure that all non-essential equipment is de-energized when left on-site and not in use to prevent electrical/fire/explosive hazards. No equipment will run overnight and/or on non-working days unless approved by the Engineer/CM or National Grid.

The Contractor will make every effort to minimize the storage of equipment or materials in areas other than the Site or SZs identified in the Contract Document.

6.3 Overnight Security

Security personnel will be provided by the contractor during non-working hours, weekends, and holidays for the duration of the IRM. The security personnel will maintain the Site sign-in sheet for the duration of the IRM.

7. Decontamination Plan

The objectives of the decontamination plan are to provide the procedures and equipment necessary to decontaminate personnel and equipment to prevent cross-contamination from the excavation to public areas (i.e., highways, roads, support trailer, vehicles, etc.). This plan does not replace the decontamination procedures outlined in the HASP, Appendix E. This plan provides additional guidelines on decontamination locations, necessary equipment, and procedures.

Primarily, the Site will be divided into three primary zones: the EZ, the CRZ, and the SZ during the implementation of remedial activities. Movement between these zones will be restricted to one location.

These locations may be further defined in the field based on work activities being conducted in an individual area as well as the results of air monitoring activities.

7.1 Decontamination Procedures

The Contractor will establish decontamination areas for the following activities.

- Personnel decontamination.
- Equipment decontamination.

7.1.1 Personnel Decontamination Station

Personnel field decontamination/cleanup will take place at the exit of the established EZs in the CRZs. If possible, these field decontamination facilities will be located upwind of the EZs.

Disposable personal protective equipment (PPE) that has been worn in an EZ will be removed and placed in the disposal container before leaving the CRZ. Once removed, disposable PPE will be collected at the field decontamination site in a drum which will then be secured to prevent the accidental spread of contamination. Additional details for personnel decontamination are presented in the HASP contained in Appendix E.

The designated personnel field decontamination area will be equipped with basins for water and detergent, and trash bags or cans for containing disposable PPE and discarded materials. Once personnel have decontaminated at this station and taken off their PPE, they will proceed to a sink where they will wash themselves as a secondary means of personal hygiene (e.g., hands, face, etc.).

The specific decontamination procedures and requirements for the disposal of decontamination wastewater are outlined in the HASP.

7.1.2 Equipment Decontamination Station

Equipment decontamination will take place on a decontamination pad that will, at a minimum, be lined with plastic, bermed, and contain a wastewater collection sump. Decontamination activities shall include the removal of contaminated soil, debris, and other miscellaneous materials from all construction equipment and tools used within the EZ using a high-pressure, low volume cleaner. In addition, physical/mechanical agitation (scraping with hand tools) of soil may be used during winter months to prevent freezing and icy conditions.

All equipment leaving the Site will be decontaminated per these guidelines. In addition, any equipment previously utilized to excavate impacted material will be decontaminated prior to use in backfilling (e.g., excavator bucket).

The decontamination pad will be constructed to adequately facilitate decontamination of the largest construction equipment and to withstand the anticipated wheel loads throughout the duration of the project. The decontamination pad will be located and constructed as detailed in the Contract Documents. Provisions will be made to control overspray at the decontamination pad(s).

Excavation equipment hand tools and miscellaneous small equipment that come in contact with excavated soils or impacted groundwater will be decontaminated on the decontamination pad in buckets of water and detergent.

Wastewater from equipment decontamination will be collected and pumped into a frac tank. Disposal of the wastewater will be handled in accordance with the Waste Management Plan (Section 8).

Soils collected from the decontamination pads will be bulked with the excavated material and sent to the properly licensed National Grid-approved disposal thermal desorption facility, as necessary.

7.1.3 Material Transport Vehicle Decontamination

Trucks transporting soil off Site will enter the excavation area as described in the Traffic Control Plan (Section 11). Care will be exercised when performing soil loading to not spill material outside of the trucks. Upon exiting the EZ, the Contractor will stage the vehicles on the equipment decontamination/anti-tracking pad. The trucks will then be visually inspected (i.e., box sidewalls, box tailgate, and tires, etc.), cleaned with brushes/brooms, and decontaminated with pressure sprayers, if necessary, prior to leaving the Site. In addition, trucks will be required to cover their material loads with a solid plastic tarp prior to departing the EZ. All collected soil and decontamination fluids will be managed in accordance with the Waste Management Plan (Section 8).

7.2 Decontamination Equipment

The Contractor will be responsible for maintaining a sufficient supply of materials/equipment required to implement decontamination procedures, including, but not limited to, the following items:

- Plastic trash barrels.
- Liners for trash barrels.
- Wash basins.
- Alconox™ detergent concentrate.
- Hand pump sprayers.
- Long handled soft bristle brushes.
- Large sponges.
- Cleaning wipes for respirators.
- Bench or stool(s).
- Stepladder(s).
- Steam generator.
- Liquid detergent and paper towels.
- Plastic trash bags.
- Supplies/equipment to construct the decontamination pads.
- Hoses, connections, pumps, etc., to collect and transport decontamination fluids to the wastewater treatment system.

8. Waste Management Plan

The objective of the waste management plan is to provide the Contractor guidelines for managing each waste stream. The Contractor will dispose of all waste materials generated as a result of the IRM in accordance with all applicable laws and regulations at a NYSDEC and National Grid-approved disposal facility. National Grid will prepare and submit to the treatment/disposal facility a generator profile of soils and wastes generated at the Site.

8.1 Disposal Record Keeping

Manifests and/or bills of lading for all shipments will be signed by the Engineer/CM and the truck driver prior to any vehicle departing the Site. A copy of the signed manifest will be maintained on file in the administrative trailer of the Contractor by the CM. Upon arrival at the disposal facility, the manifest will be signed, and a copy returned to the Engineer/CM, complete with all applicable signatures as proof of delivery. The returned manifests will be cross-checked and matched with the original copy of the manifest already on file.

A log of all shipments and copies of all manifests and/or bills of lading will be maintained by the Engineer/CM on site for reference in the Contractor's trailer. Upon completion of the IRM, National Grid will receive all logs and manifests and/or bills of lading. The logs, manifests, and bills of lading will be included in the IRM CCR following completion of the IRM to create a permanent record of disposal.

8.2 Material Shipping Procedures

Waste transporters, properly permitted by the NYSDEC, will be used to ship impacted soils to appropriately licensed NYSDEC and National Grid-approved treatment/disposal facilities. All truck permits will be provided to the Engineer/CM prior to the vehicles arriving on Site. The selected Contractor will ensure that all disposal documentation including, but not limited to, all necessary manifests, bill-of-ladings, weight tickets, and certificates of treatment/destruction has been provided to the CM.

The Contractor will coordinate with the transport and disposal facilities to determine an appropriate number of transport trucks based on the capabilities of the facility to accept material. This coordination will be critical to accommodate the sequence of excavation. To eliminate the need for the staging trucks on local roadways, trucks will be scheduled to minimize the wait time for loading. Vehicles that are waiting to be loaded will be directed to the on-site staging area, or the SZ.

Upon entry to the Site, trucks will be inspected to ensure the proper placards, decals and permits are displayed. Placards, decals, and permits not applicable to the waste stream generated to the IRM will be removed or covered prior to trucks leaving the Site. While on Site, transport trucks will remain on designated haul routes, and all loaded trucks leaving the EZ will follow the Decontamination Plan (Section 7). Transport trucks will utilize the most direct hauling route between the Site and the disposal facility.

All material transportation vehicles leaving the Site must be watertight and will be decontaminated in accordance with the Decontamination Plan prior to departing. The watertight beds will be lined with plastic truck liners prior to material being placed in the bed. If significant odors are noted, the material in the bed may be covered with Rusmar foam or similar odor suppressant prior to being covered in plastic. Finally, a solid tarp will be affixed to the truck bed to prevent odors and volatilization or fugitive dust emissions during transit to the treatment facility. In the event that a truck arrives at the Site without a solid tarp, the truck will be refused and not allowed to transport materials from the Site.

Individual waste streams will be handled as follows.

8.2.1 Impacted Soils and Bulky Waste

All excavated, MGP-related impacted material will be placed into haul vehicles and transported directly to an appropriately licensed NYSDEC and National Grid-approved facility or processed on-site to amend excessive moisture and then transported to the approved disposal facility. The Contractor will have a primary and an alternate receiving facility prepared to receive the impacted soils prior to excavation.

MGP-impacted material excavated from below the water table, that contain a moisture content that is above disposal/treatment standard to be transported safely (e.g., without risk of a liquid spilling), will be drained or amended on Site prior to shipment. These materials will be transported to the stockpile area within the exclusion zone and will be amended within the structure prior to shipping off site. Impacted soils will be amended on site adjacent to the excavation area, by the Contractor prior to shipment off Site. All amendments used will meet NYSDEC requirements.

Impacted bulky waste (i.e., concrete, debris, etc.) will be separated from source material upon excavation and transported for treatment/disposal as regulated waste at an approved facility.

8.2.2 Uncontaminated Bulky Waste

Uncontaminated bulky waste (i.e., asphalt pavement sections, concrete, and debris) will be separated, if possible, from impacted soil upon excavation, immediately placed in a roll-off container or temporarily placed on the Site for future loading and transported for disposal as construction debris at a NYSDEC and National Grid-approved recycling facility or landfill.

8.2.3 Impacted Water

Impacted liquids from the decontamination of equipment and personnel will be pumped into a frac tank and disposed of off Site. Water drained from stockpiled soils from within the stockpile area and impacted groundwater removed from the excavations to accommodate backfill will be pumped to a frac tank and disposed of off Site. The Contractor will retain a licensed liquid waste hauler to remove this liquid and properly dispose of the material in accordance with all applicable regulations. The Contractor will be responsible for obtaining any appropriate Federal, State, and/or local permits that may be required.

Solid material collected in the frac tank(s), as a result of settlement, will be bulked with the MGP-related source material and sent to an appropriately licensed NYSDEC and National Grid-approved treatment/disposal facility as necessary.

8.3 Soil Disposal Characterization Analyses

Samples collected from MGP-impacted materials for disposal will be analyzed in accordance with the receiving facilities' guidelines and all Local, State and Federal laws. It is not anticipated that any wastes generated as a result of IRM activities will be transported as hazardous. All materials will be transported as non-hazardous material to a NYSDEC and National Grid-approved facility.

The Engineer will be responsible for collecting and analyzing disposal samples as required for acceptance by various National Grid approved receiving facilities. The Engineer will complete the pre-characterization during Phase 2 of the PDI based on the NYSDEC and National Grid-approved receiving facilities' guidelines. The Contractor will use these results to select appropriate and acceptable primary and backup appropriately licensed NYSDEC and National Grid-approved disposal facilities. If the selected facility or facilities require additional disposal characterization data, it is the responsibility of the Contractor to coordinate with the Engineer and obtain the appropriate samples prior to the start of excavation activities. The Contractor will provide the Engineer the results of all analyses immediately upon receipt.

The samples will be analyzed by a New York State Environmental Laboratory Approval Program (NYS ELAP)-certified laboratory.

9. Sample Collection & Analysis Plan

The documentation sample collection and analysis plan has been designed to support the requirements of the IRM. The IRM includes the removal of MGP-related impacted material. This plan describes the sampling and analysis procedures for collecting representative samples of backfill.

As described in Section 1.4, a PDI scope of work/rationale email (conditionally approved by the NYSDEC on April 28, 2022) was developed and implemented to further define soil conditions at the limits of the proposed excavation area prior to implementation of IRM excavation activities. The sample analytical results from the PDI sample locations, supplemented by existing historical sample analytical results, has been used to define the horizontal and vertical limits of the IRM excavation, which have been adjusted as needed and as indicated in Fig. 3. Additional refinement is anticipated following the completion of Phase 2 of the PDI, which will be implemented following building demolition. As such, further documentation sampling is not anticipated to be required for the material to remain in-place below or adjacent to the IRM excavation area.

All analytical testing will be performed by a laboratory that holds a current NYSDOH-ELAP certification.

9.1 Representative Sampling of Backfill

The excavation will be backfilled with imported material that meets the specifications for the Site redevelopment. The Contractor will identify the NYSDOT-approved borrow pit location(s) of imported material prior to the start of IRM excavation activities. The Contractor will provide certificates of clean fill for the imported material identifying said material as native. In addition, the Contractor will provide analytical results from the borrow pit(s), specific to the actual fill being imported to the Site, as confirmation that the material is free of impacts. At a minimum, a sample of the backfill will be collected prior to placement at the beginning, the middle, and the end of backfill operations. Backfill samples will be analyzed by a New York State Analytical Service Protocol (NYSASP) certified laboratory for

- Pesticides,
- Target Analyte List Metals,
- PCBs by EPA Method 8082,
- PFAS by draft EPA Method 1633,

- VOCs by EPA Method 8260B or NYSASP Method 95.1, and
- SVOCs and 1,4 -dioxane by EPA Method 8270C or NYSASP Method 95-2.

9.2 Wastewater Sampling

No real-time sampling of wastewater is proposed. However, the discharge and/or influent to the frac tank(s) will be sampled by the Contractor in accordance with the conditions of the receiving facility for off-site disposal. The results will be provided to National Grid and the Engineer.

10. Wastewater Management Plan

The objective of the wastewater management plan site is to establish requirements for the collection and off-site disposal of decontamination wastewater and the control of stormwater.

10.1 Decontamination Wastewater

Wastewater associated with decontamination activities will be pumped into a covered frac tank(s) located outside of the excavation area. The frac tank(s) must be sufficiently sized to contain the wastewater and provide some primary treatment (settling) with weirs, baffles or other appropriate technology, and flow equalization, if needed. Effluent will then be sampled and disposed of off Site, as described in Subsection 10.3.

Decontamination liquids generated as wastewater will be pumped into frac tank(s) and stored at a designated location within the project limits. Solid materials at the bottom of the frac tanks will be combined with the impacted material being excavated and disposed of off Site. Any wastewater generated will be sampled prior to off-site disposal.

10.2 Groundwater Dewatering

During backfill operations, water in the excavation will be displaced by the backfill material. Groundwater within the excavation may need to be removed to prevent a discharge to the surface. Any groundwater removed from the excavation will be pumped into a covered frac tank(s) located outside of the excavation area. Additionally, any groundwater collected stockpiled soils will be pumped into the frac tank(s).

The frac tank(s) must be sufficiently sized to contain the expected dewatering volume plus 10 percent and provide some primary treatment (settling) with weirs, baffles or other technology, and flow equalization, if needed. Effluent will then be sampled and disposed of off Site, as described in subsection 10.3. Groundwater from dewatering may be bulked with the decontamination fluids if sufficient volume is available.

10.3 Off-Site Disposal of Wastewater

The Contractor will arrange for the off-site disposal of all generated wastewater (decontamination liquids and groundwater). All generated wastewater requiring off-site disposal will be handled in accordance with the Waste Management Plan (Section 8).

A licensed liquid waste hauler shall remove this liquid from the Site and properly dispose of this material in accordance with all applicable regulations and codes. The Contractor will have a primary and an alternate properly permitted, National Grid-approved treatment/disposal facility prepared to receive all liquid wastes generated. In addition, the

Contractor will ensure that off-site disposal and/or on-site storage volumes are adequate to avoid construction delays.

10.4 Stormwater Runoff Control

Stormwater contact with the impacted soils will be limited due to the erosion and sediment control barriers around the area of excavation. Therefore, it is not anticipated that runoff from the exterior will come in contact with the excavation area. The Contractor will be required to utilize appropriate control measures to route the runoff from the collection system to the appropriate outlet. Stormwater runoff control measures may include the installation of berms, barriers, and a sump for the collection and discharge of the water.

11. Traffic Control Plan

The objectives of the traffic plan are to manage construction traffic on Oak Street. The Traffic Control Plan is included in the Contract Documents and includes traffic routes for:

- Trucking soil and bulky waste off Site.
- Importing clean fill to the Site.
- Liquid waste hauler off-loading dewatered liquids if necessary.
- Contractor access and parking.
- Equipment access and storage.

Vehicles hauling impacted soil, fill materials, and supplies will enter the Bay Shore Former MGP OU-4 Area from the Sunrise Highway (State Route 27) at the 5th Avenue (County Route 13) Exit. The vehicles will follow 5th Avenue south to where it becomes Clinton Avenue and will continue south on Clinton Avenue. Vehicles will make a left turn onto Union Boulevard. Vehicles will then turn left onto 5th Avenue north and then right onto Oak Street. Vehicles will turn right into the Cesspool Area. Vehicles will not be permitted to idle in front of the Site.

Vehicles exiting the Cesspool Area will exit onto Oak Street and travel west to 5th Avenue. Vehicles will then make a right onto 5th Avenue north. Vehicles shall then retrace the entry route to exit Bay Shore.

The Contractor will provide traffic control personnel when all trucks are entering or exiting the Site onto surface roads. Traffic control personnel will also direct traffic as needed upon delivery of equipment, trailers, excavation support materials, etc. To maintain access and ensure that lines of sight are maintained, the Contractor will arrange for and coordinate with the appropriate local authorities to ensure that on-street parking nearest to the entrance/exit gates on Oak Street is limited throughout the duration of the IRM.

The Contractor shall provide a detailed traffic route for all vehicles transporting waste materials to the specific disposal facilities. The Contractor will furnish and maintain all signs and traffic controls until the completion of the project.

12. Completion of Remedial Activities

Upon completion of the remedial activities, the Site will be returned to the conditions required by the property owner for the subsequent redevelopment. Completion activities include, but may not be limited to:

- Demobilization of the storage frac tank(s).
- Removal of any temporary earth support structures.
- Demobilization of CAMP equipment.
- Removal of the decontamination pads.
- Disconnect temporary utilities.
- Final Site grading and surface restoration.
- Restoration of any Site features that have been damaged or removed.

13. IRM Construction Completion Report (IRM CCR)

Following completion of the remedial activities, an IRM CCR will be prepared and stamped by an engineer licensed to practice in the State of New York. The IRM CCR will include a summary of remedial activities, document any changes to the work plan, document the final disposal of both solid and liquid waste, and contain a statement that the work was performed in accordance with the IRM Work Plan, contract drawings, specifications, and any approved changes to those documents. The report will also contain a summation of the MGP-related impacts distribution beneath the floor of the excavation based on the previous sampling events. Specific components of the IRM CCR will include:

- Record drawings, specifications, addenda, and approved changes.
- The actual volumes of excavated material and disposed wastewater.
- The results of documentation analyses for backfill material.
- Other plans and figures (if required), photographs, cross sections, data summary tables, and appendices that will provide National Grid with an accurate accounting of the remedial measures implemented at the Site.
- Approval documents from NYSDEC.
- Approved permits.
- Summary of construction work, and changes in work scope.
- Shipping manifests and bills of lading (contaminated soil, clean fill, and construction dewatering liquids).
- Summary of air and vibration monitoring data collected during the remedial activities.
- Certification that material transported off Site was disposed of at a properly licensed NYSDEC and National Grid-approved disposal or treatment facility.

14. References

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GEI, 2010b. *Draft Cesspool Area S-ISCO IRM Post S-ISCO Soil and Groundwater Data Deliverable, OU-4 Bay Shore/Brightwaters Former MGP Site,* June 30, 2010.

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GEI, 2013. *Construction Completion Report, Operable Unit No. 4 Cesspool Area and Pond Area Excavation Interim Remedial Measure, OU-4 Bay Shore/Brightwaters Former MGP Site, October 2013.*

National Grid, 2009. *Bay Shore/Brightwaters Former MGP Site Upgradient OU-4 Cesspool Area Additional Delineation Sampling Results and Proposed Remedial Approach,* September 28, 2009.

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NYSDEC, 2010. NYSDEC *DER-10* [Department of Environmental Remediation] *Technical Guidance for Site Investigation and Remediation*, May 3, 2010.

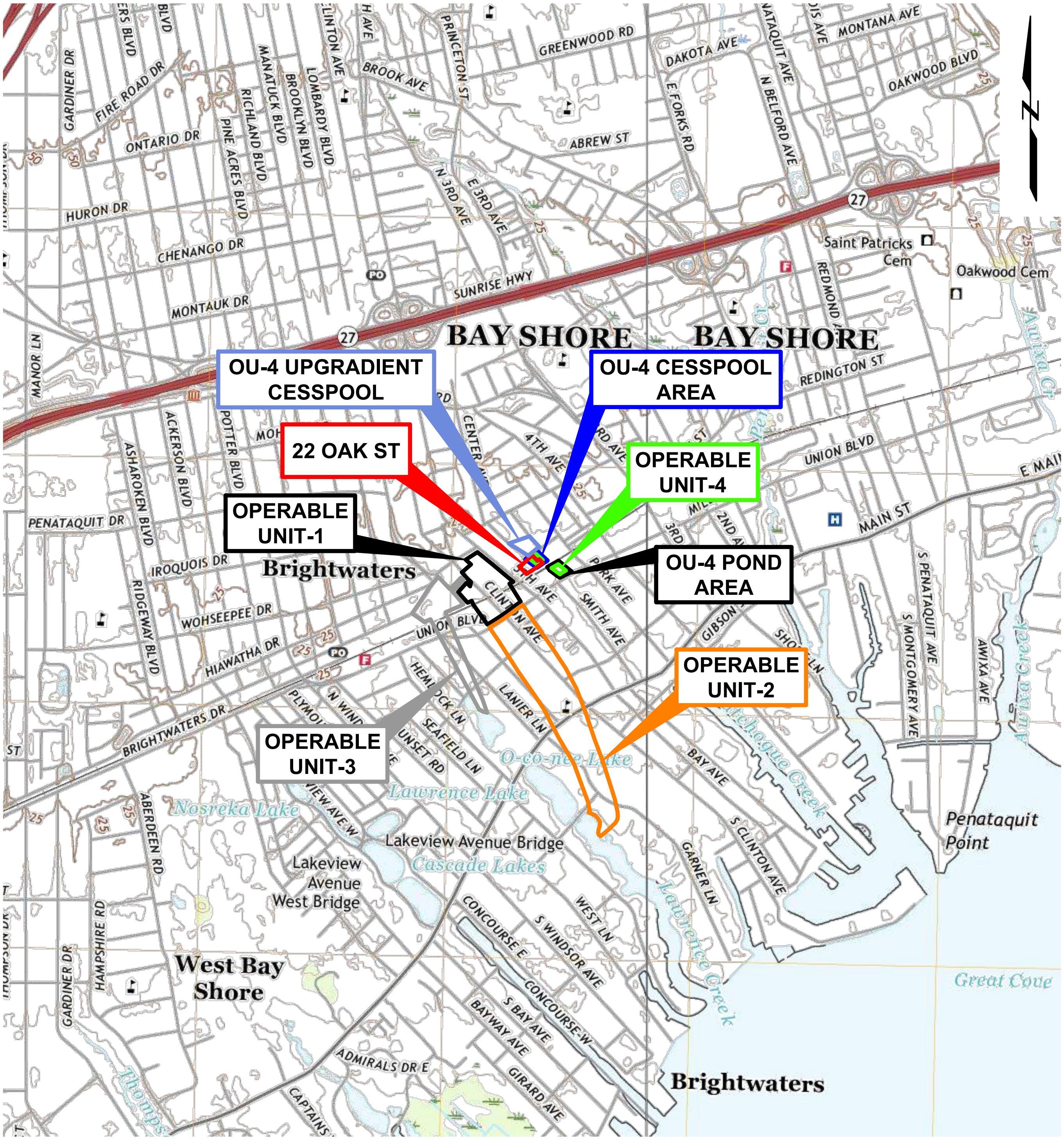
NYSDEC, 2010b. NYSDEC CP-51 [Commissioner Policy] *Soil Cleanup Guidance*, October 21, 2010.

VeruTEK Technologies, Inc., 2008. *Surfactant-Enhanced In-Situ Chemical Oxidation Work Plan (S-ISCO) Bay Shore Former MGP Site OU-4 Cesspool*, February 2008.

Administrative Order on Consent (AOC), Index Number D1-0001-98-11.

Title 6 of the New York Code of Rules and Regulations Part 375 (6 NYCRR Part 375) for interim remedial measures.

Figures



SOURCE:

U.S.G.S TOPOGRAPHIC MAP, 7.5-MINUTE SERIES: BAY SHORE EAST, NY QUADRANGLE (2019) AND BAY SHORE WEST, NY QUADRANGLE (2019). ACCESSED VIA THE NATIONAL GEOLOGIC MAP DATABASE *(https://ngmdb.usgs.gov/topoview/)*.

0 2000 4000

SCALE: 1" = 2000'

QUADRANGLE LOCATION

OU-4 22 Oak Street Excavation IRM Work Plan Bay Shore Former MGP Site Bay Shore, New York	GEI Consultants	SITE LOCATION MAP
nationalgrid	Project 093180	August 2023 Fig. 1

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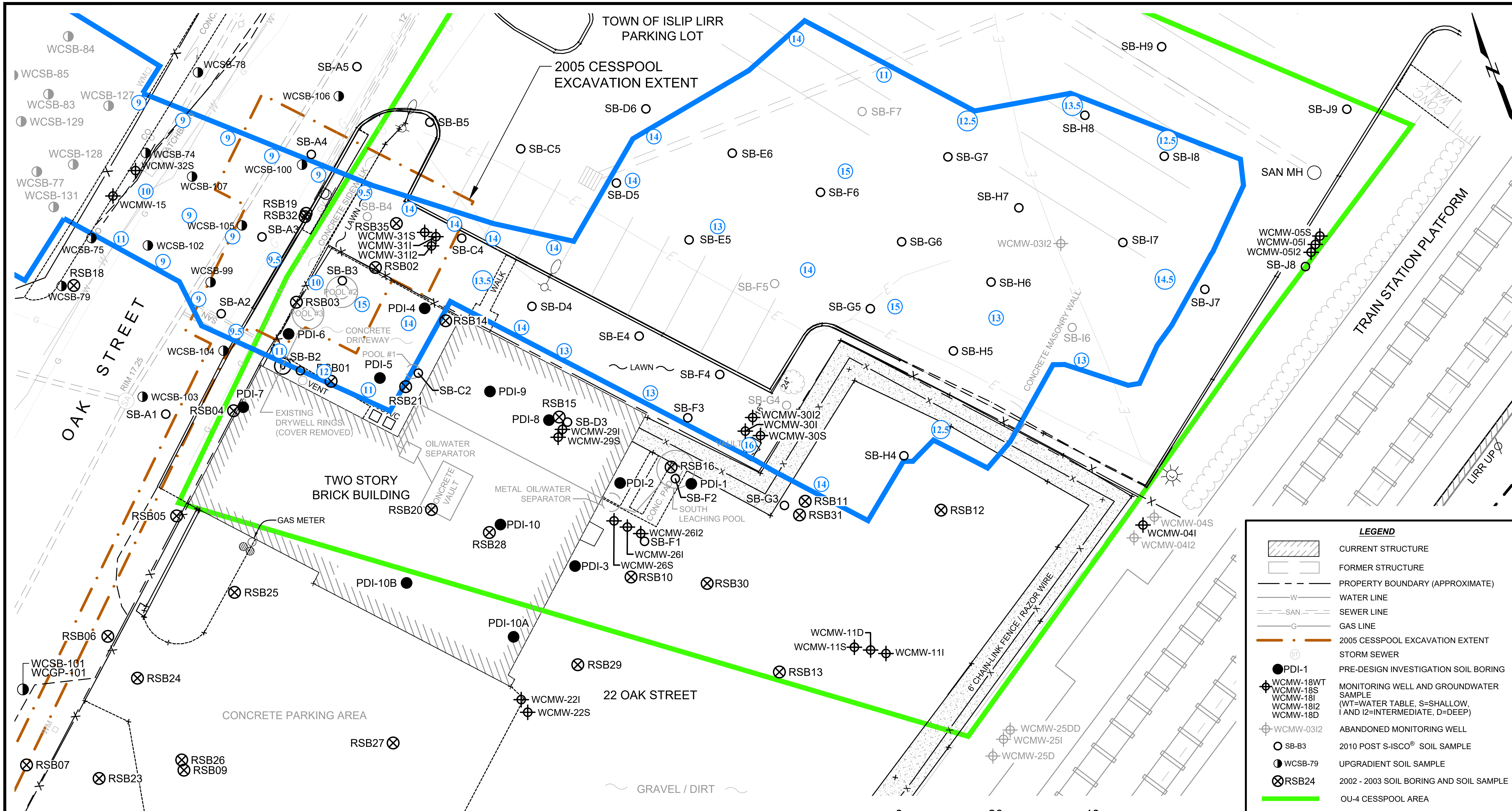

SOURCES:

1. MAP TITLED "BAY SHORE/BRIGHTWATERS, FORMER MGP SITE FINAL REMEDIAL INVESTIGATION, BAY SHORE, NEW YORK, OFF-SITE SAMPLE LOCATION MAP" DATED: SEPT. 2002 BY DVIRKA AND BARTILUCCI.
2. FIGURE 2, GROUNDWATER MONITORING WELL AND SURFACE WATER GAUGING STATION LOCATION MAP, BAY SHORE/BRIGHTWATERS FORMER MGP SITE, SCALE: 1"=200', DATED JANUARY 2004, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
3. DRAWING C-1, OFF-SITE SAMPLE LOCATION MAP, BAY SHORE/BRIGHTWATERS FINAL REMEDIAL INVESTIGATION, SCALE: 1"=200', DATED OCTOBER 15, 2003, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
4. PROPERTY BOUNDARY LOCATIONS WERE DETERMINED BY OTHERS USING AERIAL PHOTOGRAPHS AND TAX MAPS. PROPERTY BOUNDARIES ARE APPROXIMATE AND MONITORING WELLS LOCATED NEAR OR AT PROPERTY BOUNDARIES DEPICTED ON THE MAP ARE WITHIN THE ROAD RIGHT-OF-WAY.
5. SURVEY BY NELSON AND POPE, MELVILLE, N.Y. 11747-2188, DATED 5-20-08.
6. SURVEY BY NATIONAL GRID ENGINEERING AND SURVEY, INC. SURVEY DIVISION MAY 20, 2010.
7. SURVEY BY KS ENGINEERS, P.C., 494 BROAD STREET, NEWARK, N.J. 07102, DATED 9-10-10.

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WCMW-23S

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Bay Shore Former MGP Site
Bay Shore, New York

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SITE LAYOUT AND PREVIOUS SAMPLE LOCATIONS MAP

Project 093180 | August 2023 | Fig. 2

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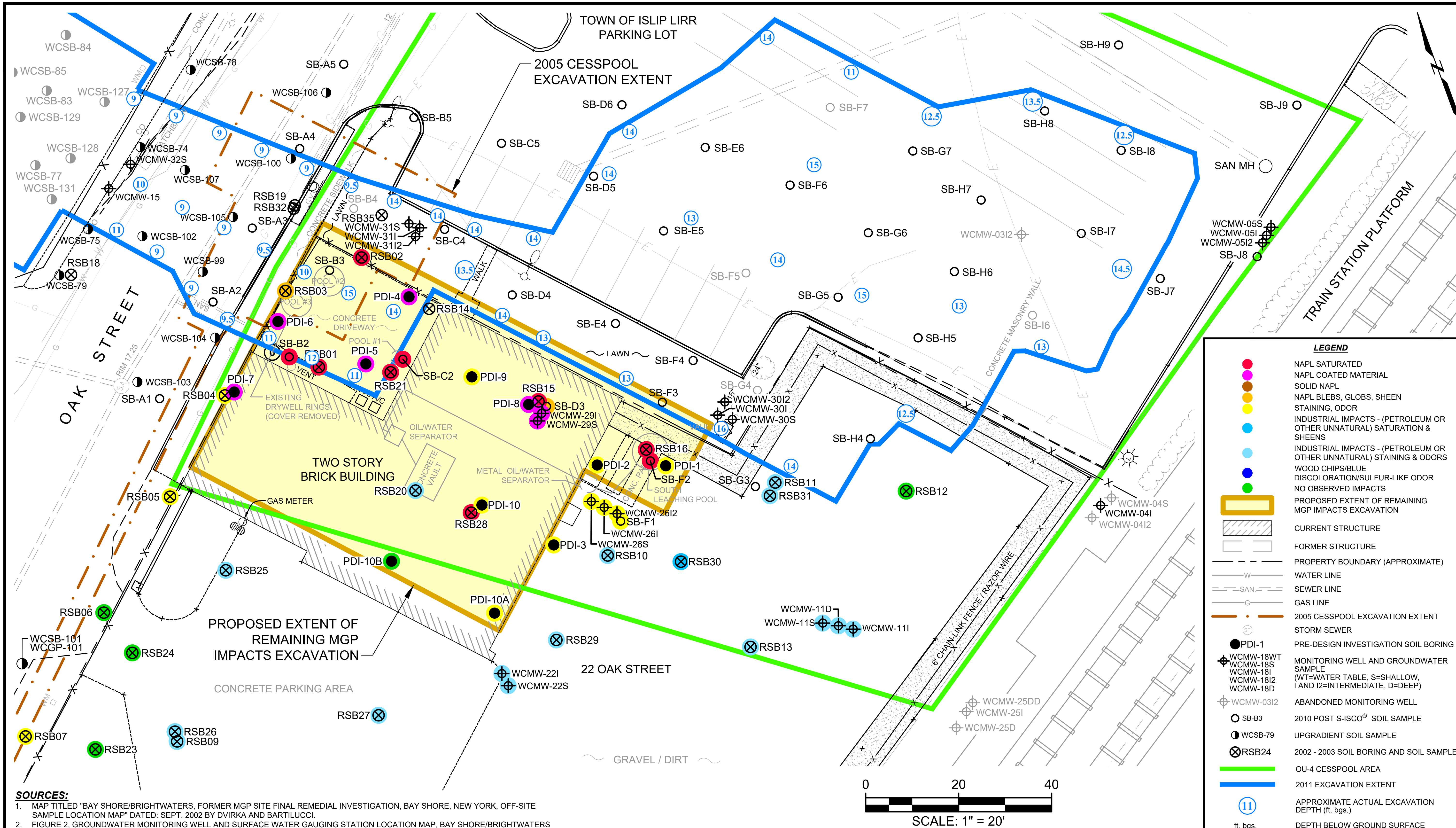

SOURCES:

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2. FIGURE 2, GROUNDWATER MONITORING WELL AND SURFACE WATER GAUGING STATION LOCATION MAP, BAY SHORE/BRIGHTWATERS FORMER MGP SITE, SCALE: 1"=200', DATED JANUARY 2004, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
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Bay Shore Former MGP Site
Bay Shore, New York

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SOIL IMPACT SUMMARY AND EXCAVATION LIMITS

August 2023

Fig. 3

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Appendix A

Historic Soil Analytical Data Tables

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-01 RSB-01 (2-4) 9/30/02 2-4	RSB-01 RSB-01 (13-15) 9/30/02 13-15	RSB-01 RSB-01 (26-28) 9/30/02 26-28	RSB-02 RSB-02 (0-2) 10/1/02 0-2	RSB-02 RSB-02 (10-12) 10/1/02 10-12	RSB-02 RSB-02 (16-18) 10/1/02 16-18
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.015 U	0.012 U	0.012 U	0.014 U	0.012 U	0.011 U
Toluene	1.5	0.015 U	0.012 U	0.012 U	0.014 U	0.012 U	0.011 U
Ethylbenzene	5.5	0.015 U	0.012 U	0.012 U	0.014 U	0.19	0.011 U
Xylene (total)	1.2	0.015 U	0.012 U	0.012 U	0.014 U	0.28	0.011 U
Total BTEX		0	0	0	0	0.47	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.015 U	0.012 U	0.012 U	0.014 U	0.012 U	0.011 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.015 U	0.022	0.012 U	0.014 U	0.012 U	0.011 U
Bromodichloromethane	---	0.015 U	0.012 U	0.012 U	0.014 U	0.012 U	0.011 U
Carbon Disulfide	2.7	0.015 U	0.0020 J	0.012 U	0.014 U	0.012 U	0.011 U
Chloroform	0.3	0.015 U	0.012 U	0.012 U	0.014 U	0.012 U	0.011 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.030 B	0.026 B	0.023 B	0.0080 J B	0.012 U	0.025 J B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.015 U	0.012 U	0.012 U	0.014 U	0.012 U	0.011 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	1	190	0.16 J	31	87	200 J
Benzo(a)pyrene	0.061	2.3	78 J	0.069 J	44	35 J	85 J
Benzo(b)fluoranthene	1.1	1.4	33 J	0.38 U	25	19 J	34 J
Benzo(k)fluoranthene	1.1	0.88	48 J	0.38 U	28	22 J	52 J
Chrysene	0.4	1.6	160 J	0.14 J	34	73 J	170 J
Dibenzo(a,h)anthracene	0.014	0.48 U	190 U	0.38 U	23 U	80 U	220 U
Indeno(1,2,3-cd)pyrene	3.2	0.61	190 U	0.38 U	19 J	80 U	220 U
Total Carcinogenic PAHs		7.79	509	0.369	179	236	541
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.23 J	190 U	0.38 U	9.2 J	97	220 U
Acenaphthene	50	0.48 U	430	0.15 J	23 U	270	200 J
Acenaphthylene	41	1.2	68 J	0.040 J	29	28 J	230
Anthracene	50	0.47 J	320	0.24 J	11 J	260	320
Benzo(g,h,i)perylene	50	0.61	190 U	0.38 U	20 J	80 U	220 U
Fluoranthene	50	0.41 J	290	0.23 J	18 J	140	320
Fluorene	50	0.55	240	0.14 J	23 U	150	330
Naphthalene	13	0.40 J	20 J	0.38 U	2.7 J	270	220 U
Phenanthrene	50	0.99	960	0.77	9.6 J	440	1100
Pyrene	50	2	390	0.33 J	31	180	440
Total Non-Carcinogenic PAHs		6.86	2718	1.9	130.5	1835	2940
Total PAHs		14.65	3227	2.269	309.5	2071	3481

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-01 RSB-01 (2-4) 9/30/02 2-4	RSB-01 RSB-01 (13-15) 9/30/02 13-15	RSB-01 RSB-01 (26-28) 9/30/02 26-28	RSB-02 RSB-02 (0-2) 10/1/02 0-2	RSB-02 RSB-02 (10-12) 10/1/02 10-12	RSB-02 RSB-02 (16-18) 10/1/02 16-18
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.48 U	190 U	0.38 U	23 U	80 U	220 U
2-Nitrophenol	0.33	0.48 U	190 U	0.38 U	23 U	80 U	220 U
bis(2-Ethylhexyl)phthalate	50	0.48 U	190 U	0.38 U	23 U	80 U	220 U
Carbazole	---	0.48 U	190 U	0.38 U	23 U	80 U	220 U
Dibenzofuran	6.2	0.48 U	31 J	0.38 U	23 U	18 J	37 J
N-Nitrosodiphenylamine	---	0.48 U	190 U	0.38 U	23 U	80 U	220 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

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22 Oak Pre IRM Report\Table 5 Chems in Soil Revised-7.23.03.XLS

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-02 RSB-02 (24-26) 10/1/02 24-26	RSB-03 RSB-03 (2-4) 9/23/02 2-4	RSB-03 RSB-03 (6-8) 9/23/02 6-8	RSB-03 RSB-03 (17-19) 9/23/02 17-19	RSB-04 RSB-04 (2-4) 9/24/02 2-4	RSB-04 RSB-04 (5-7) 9/24/02 5-7
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.013 U	0.011 U	0.020 J	0.012 U	0.011 U	0.012 U
Toluene	1.5	0.013 U	0.011 U	0.11 U	0.012 U	0.011 U	0.012 U
Ethylbenzene	5.5	0.013 U	0.011 U	1.5	0.012 U	0.011 U	0.012 U
Xylene (total)	1.2	0.013 U	0.011 U	1.2	0.012 U	0.011 U	0.012 U
Total BTEX		0	0	2.72	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.013 U	0.011 U	0.11 U	0.012 U	0.011 U	0.012 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.013 U	0.013	0.10 J	0.012 U	0.011 U	0.012 U
Bromodichloromethane	---	0.013 U	0.011 U	0.11 U	0.012 U	0.011 U	0.012 U
Carbon Disulfide	2.7	0.013 U	0.011 U	0.11 U	0.012 U	0.011 U	0.012 U
Chloroform	0.3	0.013 U	0.011 U	0.11 U	0.012 U	0.011 U	0.012 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0050 J B	0.0080 J B	0.056 J	0.0060 J B	0.0060 J B	0.0080 J B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.013 U	0.011 U	0.11 U	0.012 U	0.011 U	0.012 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.13 J	0.37 U	44 D	0.39 U	0.37 U	11 D
Benzo(a)pyrene	0.061	0.055 J	0.37 U	19 D J	0.39 U	0.37 U	5.1 D J
Benzo(b)fluoranthene	1.1	0.42 U	0.37 U	38 U	0.39 U	0.37 U	2.1
Benzo(k)fluoranthene	1.1	0.42 U	0.37 U	38 U	0.39 U	0.37 U	1.5
Chrysene	0.4	0.12 J	0.37 U	41 D	0.39 U	0.37 U	9.3 D
Dibenzo(a,h)anthracene	0.014	0.42 U	0.37 U	38 U	0.39 U	0.37 U	0.37 J
Indeno(1,2,3-cd)pyrene	3.2	0.42 U	0.37 U	4.5 D J	0.39 U	0.37 U	0.69
Total Carcinogenic PAHs		0.305	0	108.5	0	0	30.06
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.11 J	0.59	6.8 D J	0.39 U	0.37 U	0.58
Acenaphthene	50	0.20 J	0.14 J	50D	0.39 U	0.37 U	1.1
Acenaphthylene	41	0.075 J	0.13 J	11 D J	0.39 U	0.37 U	2.4
Anthracene	50	0.20 J	0.16 J	110 D	0.056 J	0.37 U	16D
Benzo(g,h,i)perylene	50	0.42 U	0.11 J	5.5 D J	0.39 U	0.37 U	0.67
Fluoranthene	50	0.20 J	0.075 J	78 D	0.39 U	0.37 U	17D
Fluorene	50	0.17 J	0.084 J	51 D	0.39 U	0.37 U	2.1
Naphthalene	13	0.080 J	0.47	48 D	0.39 U	0.37 U	0.39 U
Phenanthrene	50	0.67	0.29 J	250 D	0.074 J	0.37 U	38D
Pyrene	50	0.28 J	0.11 J	95 D	0.39 U	0.37 U	22D
Total Non-Carcinogenic PAHs		1.985	2.159	704.3	0.13	0	99.85
Total PAHs		2.29	2.159	812.8	0.13	0	129.91

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	RSB-02 RSB-02 (24-26) 10/1/02 24-26	RSB-03 RSB-03 (2-4) 9/23/02 2-4	RSB-03 RSB-03 (6-8) 9/23/02 6-8	RSB-03 RSB-03 (17-19) 9/23/02 17-19	RSB-04 RSB-04 (2-4) 9/24/02 2-4	RSB-04 RSB-04 (5-7) 9/24/02 5-7
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.42 U	0.37 U	38 U	0.39 U	0.37 U	0.39 U
2-Nitrophenol	0.33	0.42 U	0.37 U	38 U	0.39 U	0.37 U	0.39 U
bis(2-Ethylhexyl)phthalate	50	0.10 J	0.37 U	38 U	0.39 U	0.37 U	0.39 U
Carbazole	---	0.42 U	0.37 U	38 U	0.39 U	0.37 U	0.39 U
Dibenzofuran	6.2	0.42 U	0.037 J	6.1 D J	0.39 U	0.37 U	0.39 U
N-Nitrosodiphenylamine	---	0.42 U	0.37 U	38 U	0.39 U	0.37 U	0.39 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-04 RSB-04 (12-14) 9/24/02 12-14	RSB-05 RSB-05 (2-4) 9/24/02 2-4	RSB-05 RSB-05 (5-7) 9/24/02 5-7	RSB-06 RSB-06 (4-5) 9/24/02 4-5	RSB-06 RSB-06 (5-7) 9/24/02 5-7	RSB-07 RSB-07 (4-5) 9/24/02 4-5
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Toluene	1.5	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Ethylbenzene	5.5	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Xylene (total)	1.2	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.012 U	0.011 U	0.013	0.011 U	0.011 U	0.011 U
Bromodichloromethane	---	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Carbon Disulfide	2.7	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Chloroform	0.3	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0090 J B	0.0060 J B	0.0090 J B	0.0070 J B	0.0070 J B	0.0060 J B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.38 U	0.049 J	0.12 J	0.072 J	0.055 J	0.49
Benzo(a)pyrene	0.061	0.38 U	0.049 J	0.41 U	0.041 J	0.37 U	0.21 J
Benzo(b)fluoranthene	1.1	0.38 U	0.046 J	0.41 U	0.35 U	0.37 U	0.37 U
Benzo(k)fluoranthene	1.1	0.38 U	0.043 J	0.41 U	0.35 U	0.37 U	0.37 U
Chrysene	0.4	0.38 U	0.058 J	0.11 J	0.066 J	0.048 J	0.47
Dibenzo(a,h)anthracene	0.014	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.37 U
Indeno(1,2,3-cd)pyrene	3.2	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.043 J
Total Carcinogenic PAHs		0	0.245	0.23	0.179	0.103	1.213
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.38 U	0.35 U	0.41 U	0.35 U	0.11 J	0.055 J
Acenaphthene	50	0.38 U	0.35 U	0.097 J	0.35 U	0.12 J	0.5
Acenaphthylene	41	0.38 U	0.35 U	0.049 J	0.35 U	0.37 U	0.12 J
Anthracene	50	0.38 U	0.35 U	0.21 J	0.10 J	0.19 J	1.2
Benzo(g,h,i)perylene	50	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.042 J
Fluoranthene	50	0.38 U	0.051 J	0.23 J	0.11 J	0.26 J	0.77
Fluorene	50	0.38 U	0.35 U	0.11 J	0.35 U	0.10 J	0.53
Naphthalene	13	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.18 J
Phenanthrene	50	0.38 U	0.35 U	0.46	0.27 J	0.68	2.7
Pyrene	50	0.38 U	0.060 J	0.37 J	0.15 J	0.41	1
Total Non-Carcinogenic PAHs		0	0.111	1.526	0.63	1.87	7.097
Total PAHs		0	0.356	1.756	0.809	1.973	8.31

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	RSB-04 RSB-04 (12-14) 9/24/02 12-14	RSB-05 RSB-05 (2-4) 9/24/02 2-4	RSB-05 RSB-05 (5-7) 9/24/02 5-7	RSB-06 RSB-06 (4-5) 9/24/02 4-5	RSB-06 RSB-06 (5-7) 9/24/02 5-7	RSB-07 RSB-07 (4-5) 9/24/02 4-5
		Site ID/Sample ID/Date/Depth (ft)					
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.37 U
2-Nitrophenol	0.33	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.37 U
bis(2-Ethylhexyl)phthalate	50	0.24 J	0.043 J	0.41 U	0.35 U	0.37 U	0.37 U
Carbazole	---	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.37 U
Dibenzofuran	6.2	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.066 J
N-Nitrosodiphenylamine	---	0.38 U	0.35 U	0.41 U	0.35 U	0.37 U	0.37 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-07 RSB-07 (6-8) 9/24/02 6-8	RSB-08 RSB-08 (2-4) 9/25/02 2-4	RSB-08 RSB-08 (6-8) 9/25/02 6-8	RSB-09 RSB-09 (2-4) 9/30/02 2-4	RSB-09 RSB-09 (8-10) 9/30/02 8-10	RSB-09 RSB-09 (16-18) 9/30/02 16-18
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
Toluene	1.5	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
Ethylbenzene	5.5	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
Xylene (total)	1.2	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.0070 J	0.010 U	0.011 U	0.047	0.012 U	0.013 U
Bromodichloromethane	---	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
Carbon Disulfide	2.7	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
Chloroform	0.3	0.011 U	0.0020 J	0.011 U	0.011 U	0.012 U	0.013 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0070 J B	0.0020 B J	0.0070 J B	0.023 B	0.012 U	0.017 B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.010 U	0.011 U	0.011 U	0.012 U	0.013 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	21 D	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Benzo(a)pyrene	0.061	8.0 D J	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Benzo(b)fluoranthene	1.1	3.9 D J	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Benzo(k)fluoranthene	1.1	2.1	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Chrysene	0.4	20 D	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Dibenzo(a,h)anthracene	0.014	0.67	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Indeno(1,2,3-cd)pyrene	3.2	1	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Total Carcinogenic PAHs		57.57	0	0	0	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.94	0.34 U	0.38 U	4.4	0.52	0.41 U
Acenaphthene	50	14 D J	0.34 U	0.38 U	1.8 U	0.30 J	0.41 U
Acenaphthylene	41	5.3 D J	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Anthracene	50	36D	0.34 U	0.38 U	1.8 U	0.29 J	0.41 U
Benzo(g,h,i)perylene	50	0.94	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Fluoranthene	50	35D	0.049 J	0.38 U	1.8 U	0.089 J	0.41 U
Fluorene	50	23D	0.34 U	0.38 U	1.8 U	0.13 J	0.41 U
Naphthalene	13	0.37 U	0.34 U	0.38 U	1.4 J	0.38 U	0.41 U
Phenanthrene	50	100 D	0.045 J	0.38 U	0.27 J	1	0.41 U
Pyrene	50	46D	0.044 J	0.38 U	1.8 U	0.11 J	0.41 U
Total Non-Carcinogenic PAHs		261.18	0.138	0	6.07	2.439	0
Total PAHs		318.75	0.138	0	6.07	2.439	0

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-07 RSB-07 (6-8) 9/24/02 6-8	RSB-08 RSB-08 (2-4) 9/25/02 2-4	RSB-08 RSB-08 (6-8) 9/25/02 6-8	RSB-09 RSB-09 (2-4) 9/30/02 2-4	RSB-09 RSB-09 (8-10) 9/30/02 8-10	RSB-09 RSB-09 (16-18) 9/30/02 16-18
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.37 U	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
2-Nitrophenol	0.33	0.37 U	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
bis(2-Ethylhexyl)phthalate	50	0.37 U	0.34 U	0.38 U	1.8 U	2.1	0.41 U
Carbazole	---	0.37 U	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Dibenzofuran	6.2	1.7	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
N-Nitrosodiphenylamine	---	0.37 U	0.34 U	0.38 U	1.8 U	0.38 U	0.41 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	1.3	NA	NA	NA	NA
Barium	300	NA	12.4B	NA	NA	NA	NA
Cadmium	1	NA	0.010 U	NA	NA	NA	NA
Chromium	10	NA	5.3	NA	NA	NA	NA
Lead	500	NA	3.6	NA	NA	NA	NA
Mercury	0.1	NA	0.017 U	NA	NA	NA	NA
Selenium	2	NA	0.40BN	NA	NA	NA	NA
Silver	---	NA	0.082 U	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-10 RSB-10 (0-4) 9/26/02 0-4	RSB-10 RSB-10 (8-12) 9/26/02 8-12	RSB-10 RSB-10 (16-20) 9/26/02 16-20	RSB-11 RSB-11 (2-4) 10/2/02 2-4	RSB-11 RSB-11 (6-8) 10/2/02 6-8	RSB-11 RSB-11 (16-18) 10/2/02 16-18
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Toluene	1.5	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Ethylbenzene	5.5	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Xylene (total)	1.2	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Bromodichloromethane	---	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Carbon Disulfide	2.7	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Chloroform	0.3	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0030 B J	0.0040 B J	0.0040 B J	0.0050 J B	0.0030 J B	0.0050 J B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.081 J	0.047 J	0.39 U	22	0.37 U	0.41 U
Benzo(a)pyrene	0.061	0.069 J	0.38 U	0.39 U	17 J	0.37 U	0.41 U
Benzo(b)fluoranthene	1.1	0.36 U	0.38 U	0.39 U	12 J	0.37 U	0.41 U
Benzo(k)fluoranthene	1.1	0.36 U	0.38 U	0.39 U	16 J	0.37 U	0.41 U
Chrysene	0.4	0.10 J	0.048 J	0.39 U	17 J	0.37 U	0.41 U
Dibenzo(a,h)anthracene	0.014	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
Indeno(1,2,3-cd)pyrene	3.2	0.36 U	0.38 U	0.39 U	8.8 J	0.37 U	0.41 U
Total Carcinogenic PAHs		0.25	0.095	0	92.8	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.14 J	0.38 U	0.39 U	18 U	0.21 J	0.41 U
Acenaphthene	50	0.36 U	0.34 J	0.39 U	18 U	0.37 U	0.41 U
Acenaphthylene	41	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
Anthracene	50	0.36 U	0.094 J	0.39 U	18 U	0.37 U	0.41 U
Benzo(g,h,i)perylene	50	0.054 J	0.38 U	0.39 U	8.5 J	0.37 U	0.41 U
Fluoranthene	50	0.086 J	0.064 J	0.39 U	27	0.37 U	0.41 U
Fluorene	50	0.36 U	0.32 J	0.39 U	18 U	0.37 U	0.41 U
Naphthalene	13	0.056 J	0.38 U	0.39 U	18 U	0.35 J	0.41 U
Phenanthrene	50	0.080 J	0.45	0.39 U	18 U	0.37 U	0.41 U
Pyrene	50	0.15 J	0.088 J	0.39 U	24	0.37 U	0.41 U
Total Non-Carcinogenic PAHs		0.566	1.356	0	59.5	0.56	0
Total PAHs		0.816	1.451	0	152.3	0.56	0

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-10 RSB-10 (0-4) 9/26/02 0-4	RSB-10 RSB-10 (8-12) 9/26/02 8-12	RSB-10 RSB-10 (16-20) 9/26/02 16-20	RSB-11 RSB-11 (2-4) 10/2/02 2-4	RSB-11 RSB-11 (6-8) 10/2/02 6-8	RSB-11 RSB-11 (16-18) 10/2/02 16-18
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
2-Nitrophenol	0.33	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
bis(2-Ethylhexyl)phthalate	50	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
Carbazole	---	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
Dibenzofuran	6.2	0.36 U	0.38 U	0.39 U	18 U	0.37 U	0.41 U
N-Nitrosodiphenylamine	---	0.36 U	0.29 J	0.39 U	18 U	0.37 U	0.41 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-12 RSB-12 (2-4) 10/1/02 2-4	RSB-12 RSB-12 (8-10) 10/1/02 8-10	RSB-12 RSB-12 (16-18) 10/1/02 16-18	RSB-13 RSB-13 (0-4) 9/26/02 0-4	RSB-13 RSB-13 (8-12) 9/26/02 8-12	RSB-13 RSB-13 (16-20) 9/26/02 16-20
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Toluene	1.5	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Ethylbenzene	5.5	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Xylene (total)	1.2	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.011 U	0.012 U	0.012 U	0.011 U	0.018	0.013 U
Bromodichloromethane	---	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Carbon Disulfide	2.7	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Chloroform	0.3	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0070 J B	0.0040 J B	0.0050 J B	0.0030 B J	0.0040 B J	0.0040 B J
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.012 U	0.012 U	0.011 U	0.012 U	0.013 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.093 J	0.39 U	0.40 U	0.057 J	0.38 U	0.43 U
Benzo(a)pyrene	0.061	0.082 J	0.39 U	0.40 U	0.046 J	0.38 U	0.43 U
Benzo(b)fluoranthene	1.1	0.063 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Benzo(k)fluoranthene	1.1	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Chrysene	0.4	0.095 J	0.39 U	0.40 U	0.064 J	0.38 U	0.43 U
Dibenzo(a,h)anthracene	0.014	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Indeno(1,2,3-cd)pyrene	3.2	0.038 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Total Carcinogenic PAHs		0.371	0	0	0.167	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Acenaphthene	50	0.056 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Acenaphthylene	41	0.037 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Anthracene	50	0.094 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Benzo(g,h,i)perylene	50	0.056 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Fluoranthene	50	0.11 J	0.39 U	0.40 U	0.064 J	0.38 U	0.43 U
Fluorene	50	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Naphthalene	13	0.051 J	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Phenanthrene	50	0.19 J	0.047 J	0.40 U	0.35 U	0.38 U	0.43 U
Pyrene	50	0.13 J	0.39 U	0.40 U	0.068 J	0.38 U	0.43 U
Total Non-Carcinogenic PAHs		0.724	0.047	0	0.132	0	0
Total PAHs		1.095	0.047	0	0.299	0	0

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	RSB-12 RSB-12 (2-4) 10/1/02 2-4	RSB-12 RSB-12 (8-10) 10/1/02 8-10	RSB-12 RSB-12 (16-18) 10/1/02 16-18	RSB-13 RSB-13 (0-4) 9/26/02 0-4	RSB-13 RSB-13 (8-12) 9/26/02 8-12	RSB-13 RSB-13 (16-20) 9/26/02 16-20
		Site ID/Sample ID/Date/Depth (ft)					
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
2-Nitrophenol	0.33	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
bis(2-Ethylhexyl)phthalate	50	0.040 J	0.14 J	0.043 J	0.35 U	0.38 U	0.43 U
Carbazole	---	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Dibenzofuran	6.2	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
N-Nitrosodiphenylamine	---	0.36 U	0.39 U	0.40 U	0.35 U	0.38 U	0.43 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-14 RSB-14 (0-4) 9/27/02 0-4	RSB-14 RSB-14 (8-10) 9/27/02 8-10	RSB-14 RSB-14 (16-18) 9/27/02 16-18	RSB-14 RSB-14 (22-24) 9/27/02 22-24	RSB-15 RSB-15 (0-4) 9/27/02 0-4	RSB-15 RSB-15 (4-8) 9/27/02 4-8
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.0030 J	0.0020 J	0.012 U	0.011 U	0.012 U
Toluene	1.5	0.011 U	0.078	0.0070 J	0.012 U	0.011 U	0.012 U
Ethylbenzene	5.5	0.011 U	6.5D	0.012 U	0.012 U	0.011 U	0.012 U
Xylene (total)	1.2	0.011 U	4.6D	0.012 U	0.012 U	0.011 U	0.012 U
Total BTEX		0	11.181	0.009	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.015	0.02	0.014	0.012 U	0.011 U	0.012 U
Bromodichloromethane	---	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
Carbon Disulfide	2.7	0.011 U	0.012 U	0.0030 J	0.012 U	0.011 U	0.012 U
Chloroform	0.3	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.041 B	0.043 B	0.033 B	0.031 B	0.0090 B J	0.0020 B J
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	3.2	15 J	89	0.39 U	0.053 J	0.17 J
Benzo(a)pyrene	0.061	2.2	5.6 J	36 J	0.39 U	0.052 J	0.12 J
Benzo(b)fluoranthene	1.1	1.9	2.9 J	15 J	0.39 U	0.35 U	0.39 U
Benzo(k)fluoranthene	1.1	1.8	3.1 J	23 J	0.39 U	0.35 U	0.39 U
Chrysene	0.4	2.7	13 J	77 J	0.39 U	0.056 J	0.15 J
Dibenzo(a,h)anthracene	0.014	1.7 U	16 U	78 U	0.39 U	0.35 U	0.39 U
Indeno(1,2,3-cd)pyrene	3.2	1.5 J	16 U	78 U	0.39 U	0.35 U	0.39 U
Total Carcinogenic PAHs		13.3	39.6	240	0	0.161	0.44
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.35 J	55	58 J	0.39 U	0.35 U	5.3D
Acenaphthene	50	1.1 J	52	80	0.39 U	0.35 U	3.2D
Acenaphthylene	41	0.54 J	4.3 J	29 J	0.39 U	0.35 U	0.39 U
Anthracene	50	1.8	43	130	0.39 U	0.35 U	0.52
Benzo(g,h,i)perylene	50	1.9	16 U	78 U	0.39 U	0.35 U	0.39 U
Fluoranthene	50	6.2	24	130	0.39 U	0.085 J	0.33 J
Fluorene	50	0.88 J	27	85	0.39 U	0.35 U	1.4
Naphthalene	13	0.93 J	68	78 U	0.39 U	0.35 U	3.2
Phenanthrene	50	6.1	85	400	0.39 U	0.061 J	2.4
Pyrene	50	5	30	180	0.39 U	0.082 J	0.43
Total Non-Carcinogenic PAHs		24.8	388.3	1092	0	0.228	16.78
Total PAHs		38.1	427.9	1332	0	0.389	17.22

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-14 RSB-14 (0-4) 9/27/02 0-4	RSB-14 RSB-14 (8-10) 9/27/02 8-10	RSB-14 RSB-14 (16-18) 9/27/02 16-18	RSB-14 RSB-14 (22-24) 9/27/02 22-24	RSB-15 RSB-15 (0-4) 9/27/02 0-4	RSB-15 RSB-15 (4-8) 9/27/02 4-8
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.20 J	16 U	78 U	0.39 U	0.35 U	0.39 U
2-Nitrophenol	0.33	1.7 U	16 U	78 U	0.39 U	0.35 U	0.39 U
bis(2-Ethylhexyl)phthalate	50	0.40 J	16 U	78 U	0.39 U	0.35 U	0.39 U
Carbazole	---	1.0 J	16 U	78 U	0.39 U	0.35 U	0.39 U
Dibenzofuran	6.2	0.61 J	2.7 J	78 U	0.39 U	0.35 U	0.34 J
N-Nitrosodiphenylamine	---	1.7 U	16 U	78 U	0.39 U	0.35 U	0.39 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-15 RSB-15 (16-18) 9/27/02 16-18	RSB-15 RSB-15 (20-24) 9/27/02 20-24	RSB-16 RSB-16 (0-4) 9/26/02 0-4	RSB-16 RSB-16 (8-12) 9/26/02 8-12	RSB-16 RSB-16 (14-15) 9/26/02 14-15	RSB-16 RSB-16 (16-20) 9/26/02 16-20
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
Toluene	1.5	0.0020 J	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
Ethylbenzene	5.5	0.011 U	0.012 U	0.011 U	0.91	0.011 U	0.012 U
Xylene (total)	1.2	0.011 U	0.012 U	0.011 U	0.98	0.011 U	0.012 U
Total BTEX		0.002	0	0	1.89	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.019	0.012 U	0.011 U	0.12 U	0.028	0.011 J
Bromodichloromethane	---	0.011 U	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
Carbon Disulfide	2.7	0.0020 J	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
Chloroform	0.3	0.011 U	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0090 B J	0.0080 B J	0.0020 B J	0.026 B J	0.0030 B J	0.0030 B J
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.012 U	0.011 U	0.12 U	0.011 U	0.012 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	62 DJ	0.40 U	0.096 J	0.18 J	92	0.39 U
Benzo(a)pyrene	0.061	27 DJ	0.40 U	0.11 J	0.17 J	37 DJ	0.39 U
Benzo(b)fluoranthene	1.1	74 U	0.40 U	0.36 U	0.40 U	75 U	0.39 U
Benzo(k)fluoranthene	1.1	74 U	0.40 U	0.36 U	0.40 U	75 U	0.39 U
Chrysene	0.4	59 DJ	0.40 U	0.13 J	0.22 J	84	0.39 U
Dibenzo(a,h)anthracene	0.014	74 U	0.40 U	0.36 U	0.044 J	75 U	0.39 U
Indeno(1,2,3-cd)pyrene	3.2	74 U	0.40 U	0.068 J	0.074 J	9.5 DJ	0.39 U
Total Carcinogenic PAHs		148	0	0.404	0.688	222.5	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	20 DJ	0.40 U	0.24 J	14D	8.4 DJ	0.39 U
Acenaphthene	50	200 D	0.40 U	0.36 U	2.8	280	0.39 U
Acenaphthylene	41	16 DJ	0.40 U	0.070 J	0.40 U	28 DJ	0.39 U
Anthracene	50	110 D	0.40 U	0.059 J	0.41	160	0.39 U
Benzo(g,h,i)perylene	50	74 U	0.40 U	0.082 J	0.083 J	9.6 DJ	0.39 U
Fluoranthene	50	100 D	0.40 U	0.13 J	0.38 J	150	0.39 U
Fluorene	50	120 D	0.40 U	0.36 U	1.7	170	0.39 U
Naphthalene	13	38 DJ	0.40 U	0.12 J	16 D	55 DJ	0.39 U
Phenanthrene	50	380 D	0.40 U	0.11 J	2.4	520	0.064 J
Pyrene	50	150 D	0.40 U	0.15 J	0.46	210	0.39 U
Total Non-Carcinogenic PAHs		1134	0	0.961	38.233	1591	0.064
Total PAHs		1282	0	1.365	38.921	1813.5	0.064

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	RSB-15 RSB-15 (16-18) 9/27/02 16-18	RSB-15 RSB-15 (20-24) 9/27/02 20-24	RSB-16 RSB-16 (0-4) 9/26/02 0-4	RSB-16 RSB-16 (8-12) 9/26/02 8-12	RSB-16 RSB-16 (14-15) 9/26/02 14-15	RSB-16 RSB-16 (16-20) 9/26/02 16-20
		Site ID/Sample ID/Date/Depth (ft)					
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	74 U	0.40 U	0.36 U	0.40 U	75 U	0.39 U
2-Nitrophenol	0.33	74 U	0.40 U	0.36 U	0.40 U	75 U	0.39 U
bis(2-Ethylhexyl)phthalate	50	74 U	0.40 U	0.11 J	1.3	75 U	0.39 U
Carbazole	---	74 U	0.40 U	0.36 U	0.40 U	75 U	0.39 U
Dibenzofuran	6.2	13 DJ	0.40 U	0.36 U	0.72	19 DJ	0.39 U
N-Nitrosodiphenylamine	---	74 U	0.40 U	0.36 U	0.40 U	75 U	0.39 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	RSB-17 RSB-17 (0-4) 9/25/02 0-4	RSB-17 RSB-17 (8-12) 9/25/02 8-12	RSB-18 RSB-18 (0-4) 9/25/02 0-4	RSB-18 RSB-18 (8-12) 9/25/02 8-12	RSB-19 RSB-19 (1-3) 9/25/02 1-3	RSB-19 RSB-19 (16-18) 9/25/02 16-18
		Site ID/Sample ID/Date/Depth (ft)					
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.012 U	0.012 U	0.0010 J	0.011 U	0.012 U
Toluene	1.5	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
Ethylbenzene	5.5	0.011 U	0.012 U	0.012 U	0.012 U	0.45D	0.012 U
Xylene (total)	1.2	0.011 U	0.012 U	0.012 U	0.012 U	0.47D	0.012 U
Total BTEX		0	0	0	0.001	0.92	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.011 U	0.012 U	0.011 J	0.012 U	0.0070 J	0.012 U
Bromodichloromethane	---	0.011 U	0.012 U	0.012 U	0.0010 J	0.011 U	0.012 U
Carbon Disulfide	2.7	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U
Chloroform	0.3	0.0010 J	0.012 U	0.012 U	0.0070 J	0.011 U	0.012 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0020 B J	0.0030 B J	0.0020 B J	0.0020 B J	0.0050 J B	0.0080 J B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.012 U	0.012 U	0.012 U	0.011	0.012 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.35 U	0.40 U	0.042 J	0.40 U	26 D J	0.060 J
Benzo(a)pyrene	0.061	0.35 U	0.40 U	0.39 U	0.40 U	13 D J	0.39 U
Benzo(b)fluoranthene	1.1	0.35 U	0.40 U	0.39 U	0.40 U	5.6 D J	0.39 U
Benzo(k)fluoranthene	1.1	0.35 U	0.40 U	0.39 U	0.40 U	7.1 D J	0.39 U
Chrysene	0.4	0.35 U	0.40 U	0.051 J	0.40 U	23 D J	0.054 J
Dibenzo(a,h)anthracene	0.014	0.35 U	0.40 U	0.39 U	0.40 U	35 U	0.39 U
Indeno(1,2,3-cd)pyrene	3.2	0.35 U	0.40 U	0.39 U	0.40 U	35 U	0.39 U
Total Carcinogenic PAHs		0	0	0.093	0	73.7	0.114
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.35 U	0.40 U	0.39 U	0.40 U	120 D	0.39 U
Acenaphthene	50	0.35 U	0.40 U	2.8	0.40 U	94 D	0.099 J
Acenaphthylene	41	0.35 U	0.40 U	0.39 U	0.40 U	7.0 D J	0.39 U
Anthracene	50	0.35 U	0.40 U	0.16 J	0.40 U	43 D	0.11 J
Benzo(g,h,i)perylene	50	0.35 U	0.40 U	0.39 U	0.40 U	3.7 D J	0.39 U
Fluoranthene	50	0.044 J	0.40 U	0.086 J	0.40 U	38 D	0.11 J
Fluorene	50	0.35 U	0.40 U	0.92	0.40 U	44 D	0.080 J
Naphthalene	13	0.35 U	0.40 U	0.39 U	0.40 U	76 D	0.39 U
Phenanthrene	50	0.055 J	0.40 U	0.39 U	0.40 U	140 D	0.37 J
Pyrene	50	0.038 J	0.40 U	0.12 J	0.40 U	55 D	0.14 J
Total Non-Carcinogenic PAHs		0.137	0	4.086	0	620.7	0.909
Total PAHs		0.137	0	4.179	0	694.4	1.023

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-17 RSB-17 (0-4) 9/25/02 0-4	RSB-17 RSB-17 (8-12) 9/25/02 8-12	RSB-18 RSB-18 (0-4) 9/25/02 0-4	RSB-18 RSB-18 (8-12) 9/25/02 8-12	RSB-19 RSB-19 (1-3) 9/25/02 1-3	RSB-19 RSB-19 (16-18) 9/25/02 16-18
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.35 U	0.40 U	0.39 U	0.40 U	35 U	0.39 U
2-Nitrophenol	0.33	0.35 U	0.40 U	0.39 U	0.40 U	35 U	0.39 U
bis(2-Ethylhexyl)phthalate	50	0.085 J	0.40 U	0.15 J	0.40 U	35 U	0.087 J
Carbazole	---	0.35 U	0.40 U	0.39 U	0.40 U	35 U	0.39 U
Dibenzofuran	6.2	0.35 U	0.40 U	0.083 J	0.40 U	4.4 D J	0.39 U
N-Nitrosodiphenylamine	---	0.35 U	0.40 U	0.39 U	0.40 U	35 U	0.39 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	1.5	0.22 U	1.2	0.22 U	NA	NA
Barium	300	19.7B	1.6B	29.3	1.4B	NA	NA
Cadmium	1	0.011 U	0.012 U	0.13B	0.012 U	NA	NA
Chromium	10	7.2B	1.8	5.2	0.97B	NA	NA
Lead	500	5.2	0.61	41.9	0.33B	NA	NA
Mercury	0.1	0.018 U	0.02 U	0.11B	0.02 U	NA	NA
Selenium	2	0.28 UN	0.31 UN	0.74N	0.31 UN	NA	NA
Silver	---	0.08 U	0.097 U	0.095 U	0.096 U	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-20 RSB-20 (0-2) 10/1/02 0-2	RSB-20 RSB-20 (6-8) 10/1/02 6-8	RSB-20 RSB-20 (16-18) 10/1/02 16-18	RSB-21 RSB-21 (2-4) 10/2/02 2-4	RSB-21 RSB-21 (4-6) 10/2/02 4-6	RSB-21 RSB-21 (8-10) 10/2/02 8-10
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
Toluene	1.5	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
Ethylbenzene	5.5	0.011 U	0.012 U	0.012 U	0.011 U	0.0040 J	0.011 U
Xylene (total)	1.2	0.011 U	0.012 U	0.012 U	0.0040 J	0.0080 J	0.16
Total BTEX		0	0	0	0.004	0.012	0.16
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
1,2,4-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	---	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	---	NA	NA	NA	NA	NA	NA
1,4-Diethylbenzene	---	NA	NA	NA	NA	NA	NA
Acetone	0.2	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
Bromodichloromethane	---	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
Carbon Disulfide	2.7	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
Chloroform	0.3	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
Isopropylbenzene	---	NA	NA	NA	NA	NA	NA
M/P-xylenes	---	NA	NA	NA	NA	NA	NA
Methylene Chloride	0.1	0.0070 J B	0.030 J B	0.0050 J B	0.0040 J B	0.0060 J B	0.0050 J B
n-Butylbenzene	---	NA	NA	NA	NA	NA	NA
n-Propylbenzene	---	NA	NA	NA	NA	NA	NA
o-Xylene	---	NA	NA	NA	NA	NA	NA
p-Cymene	---	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Styrene	---	0.011 U	0.012 U	0.012 U	0.011 U	0.018 U	0.011 U
tert-Butylbenzene	---	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.38 U	0.058 J	0.41 U	12	19 J	44
Benzo(a)pyrene	0.061	0.38 U	0.39 U	0.41 U	6.6	9.6 J	16 J
Benzo(b)fluoranthene	1.1	0.38 U	0.39 U	0.41 U	6.4	4.3 J	7.7 J
Benzo(k)fluoranthene	1.1	0.38 U	0.39 U	0.41 U	5.2	6.9 J	9.6 J
Chrysene	0.4	0.040 J	0.074 J	0.41 U	11	18 J	38
Dibenzo(a,h)anthracene	0.014	0.38 U	0.39 U	0.41 U	3.7 U	30 U	38 U
Indeno(1,2,3-cd)pyrene	3.2	0.38 U	0.39 U	0.41 U	1.4 J	30 U	38 U
Total Carcinogenic PAHs		0.04	0.132	0	42.6	58	115.3
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.38 U	0.39 U	0.41 U	3.7 U	15 J	150
Acenaphthene	50	0.38 U	0.99	0.41 U	0.64 J	24 J	120
Acenaphthylene	41	0.38 U	0.39 U	0.41 U	3.7 U	6.7 J	16 J
Anthracene	50	0.039 J	0.13 J	0.41 U	2.4 J	22 J	130
Benzo(g,h,i)perylene	50	0.38 U	0.39 U	0.41 U	1.5 J	30 U	38 U
Fluoranthene	50	0.053 J	0.084 J	0.41 U	15	26 J	70
Fluorene	50	0.38 U	0.39	0.41 U	0.50 J	16 J	80
Naphthalene	13	0.38 U	0.39 U	0.41 U	3.7 U	9.7 J	110
Phenanthrene	50	0.12 J	0.69	0.41 U	12	54	230
Pyrene	50	0.063 J	0.074 J	0.41 U	15	38	87
Total Non-Carcinogenic PAHs		0.275	2.358	0	47.04	211.4	993
Total PAHs		0.315	2.49	0	89.64	269.4	1108.3

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

		Site ID/Sample ID/Date/Depth (ft)					
Constituent	NYS Recommended Soil Cleanup Objectives	RSB-20 RSB-20 (0-2) 10/1/02 0-2	RSB-20 RSB-20 (6-8) 10/1/02 6-8	RSB-20 RSB-20 (16-18) 10/1/02 16-18	RSB-21 RSB-21 (2-4) 10/2/02 2-4	RSB-21 RSB-21 (4-6) 10/2/02 4-6	RSB-21 RSB-21 (8-10) 10/2/02 8-10
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.38 U	0.39 U	0.41 U	3.7 U	30 U	38 U
2-Nitrophenol	0.33	0.38 U	0.39 U	0.41 U	3.7 U	30 U	38 U
bis(2-Ethylhexyl)phthalate	50	0.082 J	0.39 U	0.072 J	0.43 J	30 U	38 U
Carbazole	---	0.38 U	0.39 U	0.41 U	1.6 J	30 U	38 U
Dibenzofuran	6.2	0.38 U	0.39 U	0.41 U	3.7 U	30 U	6.2 J
N-Nitrosodiphenylamine	---	0.38 U	0.39 U	0.41 U	3.7 U	30 U	38 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	NA	NA	NA	NA	NA
Barium	300	NA	NA	NA	NA	NA	NA
Cadmium	1	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Lead	500	NA	NA	NA	NA	NA	NA
Mercury	0.1	NA	NA	NA	NA	NA	NA
Selenium	2	NA	NA	NA	NA	NA	NA
Silver	---	NA	NA	NA	NA	NA	NA
Cyanide (mg/kg)							
Cyanide	---	NA	NA	NA	NA	NA	NA

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-21 RSB-21 (24-26) 10/2/02 24-26	RSB-22 RSB-22(6-8) 4/1/03 6-8	RSB-22 RSB-22(16-20) 4/1/03 16-20	RSB-23 RSB-23(6-8) 4/1/03 6-8	RSB-23 RSB-23(16-20) 4/1/03 16-20	RSB-24 RSB-24(6-8) 4/1/03 6-8
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Toluene	1.5	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Ethylbenzene	5.5	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Xylene (total)	1.2	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
1,2,4,5-Tetramethylbenzene	---	NA	0.012 U	0.013 U	0.012 U J	0.012 U	0.012 U
1,3,5-Trimethylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
1,4-Diethylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Acetone	0.2	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U J	0.012 U J
Bromodichloromethane	---	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Carbon Disulfide	2.7	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Chloroform	0.3	0.013 U	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Isopropylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
M/P-xylenes	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Methylene Chloride	0.1	0.0050 J B	0.012 B J U	0.013 B J U	0.012 B J U	0.012 B J	0.012 B J
n-Butylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
n-Propylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
o-Xylene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
p-Cymene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
sec-Butylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Styrene	---	0.013 U	0.012 U	0.013 U	0.012 U J	0.012 U	0.012 U
tert-Butylbenzene	---	NA	0.012 U	0.013 U	0.012 U	0.012 U	0.012 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Benzo(a)pyrene	0.061	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Benzo(b)fluoranthene	1.1	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Benzo(k)fluoranthene	1.1	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Chrysene	0.4	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Dibenzo(a,h)anthracene	0.014	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Indeno(1,2,3-cd)pyrene	3.2	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Total Carcinogenic PAHs		0	0	0	0	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Acenaphthene	50	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Acenaphthylene	41	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Anthracene	50	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Benzo(g,h,i)perylene	50	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Fluoranthene	50	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Fluorene	50	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Naphthalene	13	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Phenanthrene	50	0.42 U	0.40 U	0.42 U	0.086 J	0.41 U	0.20 J
Pyrene	50	0.42 U	0.40 U	0.42 U	0.081 J	0.41 U	0.089 J
Total Non-Carcinogenic PAHs		0	0	0	0.167	0	0.289
Total PAHs		0	0	0	0.167	0	0.289

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommunded Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-21 RSB-21 (24-26) 10/2/02 24-26	RSB-22 RSB-22(6-8) 4/1/03 6-8	RSB-22 RSB-22(16-20) 4/1/03 16-20	RSB-23 RSB-23(6-8) 4/1/03 6-8	RSB-23 RSB-23(16-20) 4/1/03 16-20	RSB-24 RSB-24(6-8) 4/1/03 6-8
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
2-Nitrophenol	0.33	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
bis(2-Ethylhexyl)phthalate	50	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Carbazole	---	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Dibenzofuran	6.2	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
N-Nitrosodiphenylamine	---	0.42 U	0.40 U	0.42 U	0.39 U	0.41 U	0.38 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	NA	0.14 U J	0.15 U J	0.38 U J	0.40 U J	0.37 U J
Barium	300	NA	1.5B	1.5B	1.8B	2.0B	2.1B
Cadmium	1	NA	0.012 U J	0.013 U J	0.036 U	0.037 U	0.035 U
Chromium	10	NA	0.96B	0.96B	1.8	1.0B	1.4
Lead	500	NA	0.66	0.6	0.69	0.68	0.62
Mercury	0.1	NA	0.02 U	0.02 U	0.020 U J	0.021 U J	0.02 U J
Selenium	2	NA	0.26 U	0.28 U	0.45 U	0.47 U	0.44 U
Silver	---	NA	0.048 U	0.051 U	0.12 U	0.12 U	0.12 U
Cyanide (mg/kg)							
Cyanide	---	NA	0.5 U	0.5 U J	0.59 U	0.62 U	0.58 U

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-24 RSB-24(16-20) 4/1/03 16-20	RSB-25 RSB-25(6-8) 4/1/03 6-8	RSB-25 RSB-25(8-12) 4/1/03 8-12	RSB-25 RSB-25(16-20) 4/1/03 16-20	RSB-25 RSB-25(24-28) 4/1/03 24-28	RSB-26 RSB-26(2-4) 4/1/03 2-4
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Toluene	1.5	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Ethylbenzene	5.5	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Xylene (total)	1.2	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.093D J
1,2,4-Trimethylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
1,2,4,5-Tetramethylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	8.7 J
1,3,5-Trimethylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
1,4-Diethylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	2.4D J
Acetone	0.2	0.012 U J	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Bromodichloromethane	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Carbon Disulfide	2.7	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Chloroform	0.3	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Isopropylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
M/P-xylenes	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Methylene Chloride	0.1	0.012 B J	0.012 B J U	0.013 B J U	0.0050 B J	0.013 B J	0.057 B J U
n-Butylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	3.7D J
n-Propylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
o-Xylene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
p-Cymene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.88D J
sec-Butylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	2.7D J
Styrene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
tert-Butylbenzene	---	0.012 U	0.012 U	0.013 U	0.012 U	0.013 U	0.057 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Benzo(a)pyrene	0.061	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Benzo(b)fluoranthene	1.1	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Benzo(k)fluoranthene	1.1	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Chrysene	0.4	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Dibenzo(a,h)anthracene	0.014	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Indeno(1,2,3-cd)pyrene	3.2	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Total Carcinogenic PAHs		0	0	0	0	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	6
Acenaphthene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.37 J
Acenaphthylene	41	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Anthracene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.11 J
Benzo(g,h,i)perylene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Fluoranthene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.16 J
Fluorene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.25 J
Naphthalene	13	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	1
Phenanthrene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.42
Pyrene	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.25 J
Total Non-Carcinogenic PAHs		0	0	0	0	0	8.56
Total PAHs		0	0	0	0	0	8.56

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-24 RSB-24(16-20) 4/1/03 16-20	RSB-25 RSB-25(6-8) 4/1/03 6-8	RSB-25 RSB-25(8-12) 4/1/03 8-12	RSB-25 RSB-25(16-20) 4/1/03 16-20	RSB-25 RSB-25(24-28) 4/1/03 24-28	RSB-26 RSB-26(2-4) 4/1/03 2-4
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
2-Nitrophenol	0.33	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
bis(2-Ethylhexyl)phthalate	50	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Carbazole	---	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Dibenzofuran	6.2	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
N-Nitrosodiphenylamine	---	0.41 U	0.38 U	0.42 U	0.40 U	0.42 U	0.38 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	0.4 U J	0.14 U J	0.14 U J	0.14 U J	0.14 U J	1.3B J
Barium	300	2.3B	3.5B	1.9B	5.6B	1.9B	22.5B
Cadmium	1	0.038 U	0.026B J U	0.012 U J	0.012 U J	0.012 U J	0.012 U J
Chromium	10	1.1B	2	1.4	1.7	1.2B	9.9
Lead	500	0.66	1	0.92	1.1	1	5.2
Mercury	0.1	0.020 U J	0.02 U	0.02 U	0.02 U	0.02 U	0.019 U
Selenium	2	0.47 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
Silver	---	0.12 U	0.048 U	0.048 U	0.048 U	0.055B U	0.048 U
Cyanide (mg/kg)							
Cyanide	---	0.62 U	0.5 U J	0.5 U J	0.5 U J	0.5 U J	0.5 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-26 RSB-26(4-8) 4/1/03 4-8	RSB-26 (Dup) RSB-100(8-12) 4/1/03 4-8	RSB-26 RSB-26(10-12) 4/1/03 10-12	RSB-26 RSB-26(24-28) 4/1/03 24-28	RSB-27 RSB-27(2-4) 4/1/03 2-4	RSB-27 RSB-27(6-8) 4/1/03 6-8
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Toluene	1.5	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Ethylbenzene	5.5	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Xylene (total)	1.2	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/Kg)							
1,1,2-Trichloroethane	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
1,2,4-Trimethylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
1,2,4,5-Tetramethylbenzene	---	1.1D J	0.012 U	0.012 U	0.013 U	0.019	0.011 U
1,3,5-Trimethylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
1,4-Diethylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.0030 J	0.011 U
Acetone	0.2	0.084D U	0.012 U	0.012 U J	0.013 U	0.011 U J	0.011 U J
Bromodichloromethane	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Carbon Disulfide	2.7	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Chloroform	0.3	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Isopropylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
M/P-xylenes	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Methylene Chloride	0.1	0.058 B J U	0.0050 B J	0.012 B J U	0.013 B J U	0.011 B J	0.011 B J U
n-Butylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.0030 J	0.011 U
n-Propylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
o-Xylene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
p-Cymene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
sec-Butylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Styrene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
tert-Butylbenzene	---	0.058 U	0.012 U	0.012 U	0.013 U	0.011 U	0.011 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Benzo(a)pyrene	0.061	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Benzo(b)fluoranthene	1.1	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Benzo(k)fluoranthene	1.1	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Chrysene	0.4	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Dibenzo(a,h)anthracene	0.014	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Indeno(1,2,3-cd)pyrene	3.2	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Total Carcinogenic PAHs		0	0	0	0	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.10 J	0.39 U	0.40 U	0.43 U	0.13 J	0.38 U
Acenaphthene	50	1.4	2.6	0.40 U	0.43 U	0.36 U	0.38 U
Acenaphthylene	41	0.38 U	0.41	0.40 U	0.43 U	0.36 U	0.38 U
Anthracene	50	2.4	3.3	0.40 U	0.43 U	0.36 U	0.38 U
Benzo(g,h,i)perylene	50	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Fluoranthene	50	0.16 J	0.21 J	0.40 U	0.43 U	0.36 U	0.38 U
Fluorene	50	0.45	0.67	0.40 U	0.43 U	0.36 U	0.38 U
Naphthalene	13	0.38 U	0.39 U	0.40 U	0.43 U	0.10 J	0.38 U
Phenanthrene	50	9.3 D	18 D	0.40 U	0.43 U	0.36 U	0.38 U
Pyrene	50	0.16 J	0.18 J	0.40 U	0.43 U	0.36 U	0.38 U
Total Non-Carcinogenic PAHs		13.97	25.37	0	0	0.23	0
Total PAHs		13.97	25.37	0	0	0.23	0

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-26	RSB-26 (Dup)	RSB-26	RSB-26	RSB-27	RSB-27
		RSB-26(4-8)	RSB-100(8-12)	RSB-26(10-12)	RSB-26(24-28)	RSB-27(2-4)	RSB-27(6-8)
		4/1/03	4/1/03	4/1/03	4/1/03	4/1/03	4/1/03
		4-6	4-8	10-12	24-28	2-4	6-8
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
2-Nitrophenol	0.33	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
bis(2-Ethylhexyl)phthalate	50	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Carbazole	---	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Dibenzofuran	6.2	0.38 U	0.44	0.40 U	0.43 U	0.36 U	0.38 U
N-Nitrosodiphenylamine	---	0.38 U	0.39 U	0.40 U	0.43 U	0.36 U	0.38 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	0.64B J	0.59B	0.14 U J	0.16 U J	0.88 J	0.14 U J
Barium	300	3.0B	3.3B	1.3B	3.6B	13.0B	2.2B
Cadmium	1	0.012 U J	0.035 U	0.012 U J	0.013 U J	0.012 U J	0.011 U J
Chromium	10	3.1B	2.5	1.6	2.5	6.2	2.8
Lead	500	1.3	0.95	1.8B	1.5	5.7	1.5
Mercury	0.1	0.02 U	0.02 U	0.02 U	0.022 U	0.02 U	0.019 U
Selenium	2	0.25 U	0.44 U	0.27 U	0.29 U	0.29B U	0.25 U
Silver	---	0.046 U	0.12 U	0.048 U	0.052 U	0.043 U	0.55B J
Cyanide (mg/kg)							
Cyanide	---	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-27 RSB-27(12-16) 4/1/03 12-16	RSB-27 RSB-27(24-28) 4/1/03 24-28	RSB-28 RSB-28(6-8) 4/3/03 6-8	RSB-28 RSB-28(9.9-10.9 4/3/03 9.9-10.9	RSB-28 RSB-28(18-20) 4/3/03 18-20	RSB-28 RSB-28(24-28) 4/3/03 24-28
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Toluene	1.5	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Ethylbenzene	5.5	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Xylene (total)	1.2	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	---	0.012 U	0.012 U	0.12 U	0.070 J	0.012 U	0.012 U
1,2,4,5-Tetramethylbenzene	---	0.012 U	0.012 U	0.35	0.13	0.012 U J	0.012 U
1,3,5-Trimethylbenzene	---	0.012 U	0.012 U	0.12 U	0.030 J	0.012 U	0.012 U
1,4-Diethylbenzene	---	0.012 U	0.012 U	0.12 U	0.10 J	0.012 U	0.012 U
Acetone	0.2	0.012 U J	0.012 U J	0.12 U	0.12 U	0.012 U J	0.012 U
Bromodichloromethane	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Carbon Disulfide	2.7	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Chloroform	0.3	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Isopropylbenzene	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
M/P-xylenes	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
Methylene Chloride	0.1	0.012 B J U	0.012 B J U	0.12 B J U	0.080 B J	0.012 B J U	0.0050 B J
n-Butylbenzene	---	0.012 U	0.012 U	0.12 U	0.050 J	0.012 U	0.012 U
n-Propylbenzene	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
o-Xylene	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
p-Cymene	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
sec-Butylbenzene	---	0.012 U	0.012 U	0.070 J	0.12 U	0.012 U	0.012 U
Styrene	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U	0.012 U
tert-Butylbenzene	---	0.012 U	0.012 U	0.12 U	0.12 U	0.012 U J	0.012 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.39 U	0.41 U	0.39 U	1.3	0.39 U	0.41 U
Benzo(a)pyrene	0.061	0.39 U	0.41 U	0.39 U	0.59	0.39 U	0.41 U
Benzo(b)fluoranthene	1.1	0.39 U	0.41 U	0.39 U	0.29 J	0.39 U	0.41 U
Benzo(k)fluoranthene	1.1	0.39 U	0.41 U	0.39 U	0.32 J	0.39 U	0.41 U
Chrysene	0.4	0.39 U	0.41 U	0.39 U	1.2	0.39 U	0.41 U
Dibenzo(a,h)anthracene	0.014	0.39 U	0.41 U	0.39 U	0.39 U	0.39 U	0.41 U
Indeno(1,2,3-cd)pyrene	3.2	0.39 U	0.41 U	0.39 U	0.081 J	0.39 U	0.41 U
Total Carcinogenic PAHs		0	0	0	3.781	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.39 U	0.41 U	5.1	0.39 U	0.95	0.41 U
Acenaphthene	50	0.39 U	0.41 U	1.3	1.1	0.12 J	0.41 U
Acenaphthylene	41	0.39 U	0.41 U	0.39 U	0.37 J	0.39 U	0.41 U
Anthracene	50	0.39 U	0.41 U	0.25 J	2	0.39 U	0.41 U
Benzo(g,h,i)perylene	50	0.39 U	0.41 U	0.39 U	0.11 J	0.39 U	0.41 U
Fluoranthene	50	0.39 U	0.41 U	0.082 J	2.5	0.39 U	0.41 U
Fluorene	50	0.39 U	0.41 U	0.59	1.3	0.39 U	0.41 U
Naphthalene	13	0.39 U	0.41 U	0.39 U	0.39 U	0.86	0.41 U
Phenanthrene	50	0.39 U	0.41 U	1	6.8 D	0.39 U	0.41 U
Pyrene	50	0.39 U	0.41 U	0.14 J	3.6	0.39 U	0.41 U
Total Non-Carcinogenic PAHs		0	0	8.462	17.78	1.93	0
Total PAHs		0	0	8.462	21.561	1.93	0

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-27 RSB-27(12-16) 4/1/03 12-16	RSB-27 RSB-27(24-28) 4/1/03 24-28	RSB-28 RSB-28(6-8) 4/3/03 6-8	RSB-28 RSB-28(9.9-10.9 4/3/03 9.9-10.9	RSB-28 RSB-28(18-20) 4/3/03 18-20	RSB-28 RSB-28(24-28) 4/3/03 24-28
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.39 U	0.41 U	0.39 U	0.39 U	0.39 U	0.41 U
2-Nitrophenol	0.33	0.39 U	0.41 U	0.39 U	0.39 U	0.39 U	0.41 U
bis(2-Ethylhexyl)phthalate	50	0.39 U	0.41 U	0.39 U	0.39 U	0.39 U	0.41 U
Carbazole	---	0.39 U	0.41 U	0.39 U	0.39 U	0.39 U	0.41 U
Dibenzofuran	6.2	0.39 U	0.41 U	0.39 U J	0.13 J	0.39 U	0.41 U
N-Nitrosodiphenylamine	---	0.39 U	0.41 U	0.39 U	0.39 U	0.39 U	0.41 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	0.14 U J	0.15 U J	0.38 U	0.38 U	0.58B U	0.39 U
Barium	300	1.8B	2.8B	3.9	2.5B	5.6B	1.9B
Cadmium	1	0.012 U J	0.012 U J	0.055B U	0.039B U	0.035 U	0.037 U
Chromium	10	1.2	1.5	2.3	1.8	4.1	2
Lead	500	1.5	0.9	1.6	0.73	1.1	0.68
Mercury	0.1	0.02 U	0.021 U	0.020 U	0.020 U	0.020 U	0.020 U
Selenium	2	0.26 U	0.27 U	0.45 U	0.45 U	0.45 U	0.47 U
Silver	---	0.047 U	0.049 U	0.12 U J	0.12 U J	0.12 U J	0.12 U J
Cyanide (mg/kg)							
Cyanide	---	0.5 U	0.5 U	0.59 U	0.60 U	0.59 U	0.61 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-29 RSB-29(0-4) 4/3/03 0-4	RSB-29 RSB-29(6-8) 4/3/03 6-8	RSB-29 RSB-29(9-12) 4/3/03 9-12	RSB-29 (Dup) RSB-102(13-16) 4/3/03 9-12	RSB-29 RSB-29(16-20) 4/3/03 16-20	RSB-30 RSB-30(6-8) 4/2/03 6-8
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Toluene	1.5	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Ethylbenzene	5.5	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Xylene (total)	1.2	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
1,2,4-Trimethylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
1,2,4,5-Tetramethylbenzene	---	0.13	0.19	0.012 U	0.012 U	0.012 U	0.18 J
1,3,5-Trimethylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
1,4-Diethylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Acetone	0.2	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Bromodichloromethane	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Carbon Disulfide	2.7	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Chloroform	0.3	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Isopropylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
M/P-xylenes	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Methylene Chloride	0.1	0.070 B J	0.12 B J U	0.012 B J U	0.0050 B J	0.0080 B J	0.055 B J U
n-Butylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
n-Propylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
o-Xylene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
p-Cymene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
sec-Butylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Styrene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U J
tert-Butylbenzene	---	0.12 U	0.12 U	0.012 U	0.012 U	0.012 U	0.055 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.085 J	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Benzo(a)pyrene	0.061	0.10 J	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Benzo(b)fluoranthene	1.1	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Benzo(k)fluoranthene	1.1	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Chrysene	0.4	0.10 J	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Dibenzo(a,h)anthracene	0.014	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Indeno(1,2,3-cd)pyrene	3.2	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Total Carcinogenic PAHs		0.285	0	0	0	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	3.4	7.4 D	0.39 U	0.39 U	0.40 U	5
Acenaphthene	50	0.12 J	0.96	0.39 U	0.39 U	0.40 U	0.10 J
Acenaphthylene	41	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Anthracene	50	0.39 U	0.10 J	0.39 U	0.39 U	0.40 U	0.37 U
Benzo(g,h,i)perylene	50	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Fluoranthene	50	0.11 J	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Fluorene	50	0.30 J	0.35 J	0.39 U	0.39 U	0.40 U	0.23 J
Naphthalene	13	2.1	3.7	0.39 U	0.39 U	0.40 U	0.9
Phenanthrene	50	0.37 J	0.5	0.39 U	0.39 U	0.40 U	0.42
Pyrene	50	0.17 J	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Total Non-Carcinogenic PAHs		6.57	13.01	0	0	0	6.65
Total PAHs		6.855	13.01	0	0	0	6.65

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-29 RSB-29(0-4) 4/3/03 0-4	RSB-29 RSB-29(6-8) 4/3/03 6-8	RSB-29 RSB-29(9-12) 4/3/03 9-12	RSB-29 (Dup) RSB-102(13-16) 4/3/03 9-12	RSB-29 RSB-29(16-20) 4/3/03 16-20	RSB-30 RSB-30(6-8) 4/2/03 6-8
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
2-Nitrophenol	0.33	0.39 U	0.4	0.39 U	0.39 U	0.40 U	0.37 U
bis(2-Ethylhexyl)phthalate	50	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Carbazole	---	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Dibenzofuran	6.2	0.35 J	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
N-Nitrosodiphenylamine	---	0.39 U	0.38 U	0.39 U	0.39 U	0.40 U	0.37 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	1.2 U	0.67B U	0.38 U	0.38 U	0.39B U	0.35 U J
Barium	300	35.4	20.3B	1.8B	2.0B	3.5B	3.9B
Cadmium	1	0.035 U	0.035 U	0.035 U	0.035 U	0.036 U	0.033 U
Chromium	10	6.9	8	1.5	2.2	1.3	3.3
Lead	500	46.4	4	0.61	0.56	0.33B U	1.5
Mercury	0.1	0.11	0.019 U	0.020 U	0.020 U	0.020 U	0.018 U J
Selenium	2	0.93 U J	0.80 U J	0.45 U	0.45 U	0.46 U	0.42 U
Silver	---	0.12 U J	0.12 U J	0.22B J	0.12 U	0.12 U J	0.11 U
Cyanide (mg/kg)							
Cyanide	---	0.59 U	0.58 U	0.59 U	0.59 U	0.61 U	0.55 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-30 RSB-30(8-12) 4/2/03 8-12	RSB-30 RSB-30(16-18) 4/2/03 16-18	RSB-30 RSB-30(24-28) 4/2/03 24-28	RSB-31 RSB-31(4-7) 4/2/03 4-7	RSB-31 RSB-31(8-12) 4/2/03 8-12	RSB-31 (Dup) RSB-101(12-16) 4/2/03 8-12
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Toluene	1.5	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Ethylbenzene	5.5	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Xylene (total)	1.2	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,2,4,5-Tetramethylbenzene	---	0.012 U J	0.012 U J	0.012 U J	0.011 U J	0.012 U J	0.012 U
1,3,5-Trimethylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,4-Diethylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Acetone	0.2	0.012 U J	0.012 U	0.012 U J	0.011 U J	0.012 U	0.012 U
Bromodichloromethane	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Carbon Disulfide	2.7	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Chloroform	0.3	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Isopropylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
M/P-xylenes	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Methylene Chloride	0.1	0.012 B J	0.012 B J U	0.012 B J U	0.011 B J	0.012 B J U	0.0040 B J
n-Butylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
n-Propylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
o-Xylene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
p-Cymene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
sec-Butylbenzene	---	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Styrene	---	0.012 U	0.012 U J	0.012 U	0.011 U	0.012 U J	0.012 U
tert-Butylbenzene	---	0.012 U J	0.012 U	0.012 U J	0.011 U J	0.012 U	0.012 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Benzo(a)pyrene	0.061	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Benzo(b)fluoranthene	1.1	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Benzo(k)fluoranthene	1.1	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Chrysene	0.4	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Dibenzo(a,h)anthracene	0.014	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Indeno(1,2,3-cd)pyrene	3.2	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Total Carcinogenic PAHs		0	0	0	0	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Acenaphthene	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Acenaphthylene	41	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Anthracene	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Benzo(g,h,i)perylene	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Fluoranthene	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Fluorene	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Naphthalene	13	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Phenanthrene	50	0.14 J	0.40 U	0.41 U	0.38 U	0.39 U	0.089 J
Pyrene	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Total Non-Carcinogenic PAHs		0.14	0	0	0	0	0.089
Total PAHs		0.14	0	0	0	0	0.089

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-30 RSB-30(8-12) 4/2/03 8-12	RSB-30 RSB-30(16-18) 4/2/03 16-18	RSB-30 RSB-30(24-28) 4/2/03 24-28	RSB-31 RSB-31(4-7) 4/2/03 4-7	RSB-31 RSB-31(8-12) 4/2/03 8-12	RSB-31 (Dup) RSB-101(12-16) 4/2/03 8-12
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
2-Nitrophenol	0.33	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
bis(2-Ethylhexyl)phthalate	50	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Carbazole	---	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Dibenzofuran	6.2	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
N-Nitrosodiphenylamine	---	0.39 U	0.40 U	0.41 U	0.38 U	0.39 U	0.39 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	0.37 U J	0.39 U J	0.39 U J	0.37 U J	0.37 U J	0.37 U
Barium	300	1.5B	9.1B	2.4B	11.2B	1.6B	1.85B
Cadmium	1	0.035 U	0.036 U	0.037 U	0.034 U	0.035 U	0.035 U
Chromium	10	1.6	1.8	1.6	5.7	2.4	1.93
Lead	500	0.74	0.9	0.95	2.7	1.1	1.18
Mercury	0.1	0.019 U J	0.020 U J	0.021 U J	0.019 U J	0.020 U J	0.02 U
Selenium	2	0.44 U	0.46 U	0.47 U	0.43 U	0.44 U	0.44 U
Silver	---	0.12 U	0.12 U	0.12 U	0.11 U	0.12 U	0.12 U
Cyanide (mg/kg)							
Cyanide	---	0.58 U	0.60 U	0.62 U	0.57 U	0.59 U	0.58 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-31	RSB-31	RSB-32	RSB-32	RSB-32	RSB-32
		RSB-31(7.2-7.7)	RSB-31(16-20)	RSB-32(0-4)	RSB-32(4-8)	RSB-32(12-16)	RSB-32(24-28)
		4/2/03	4/2/03	4/2/03	4/2/03	4/2/03	4/2/03
		7.2-7.7	16-20	0-4	4-8	12-16	24-28
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Toluene	1.5	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.0030 J
Ethylbenzene	5.5	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Xylene (total)	1.2	0.056 U	0.012 U	0.81	0.11 U	0.012 U	0.012 U
Total BTEX		0	0	0.81	0	0	0.003
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	---	0.071	0.012 U	1.8	0.060 J	0.012 U	0.012 U
1,2,4,5-Tetramethylbenzene	---	0.70 J	0.012 U J	1.9 J	0.58 J	0.012 U J	0.012 U
1,3,5-Trimethylbenzene	---	0.056 U	0.012 U	1.6	0.050 J	0.012 U	0.012 U
1,4-Diethylbenzene	---	0.49	0.012 U	6.7	0.2	0.012 U	0.012 U
Acetone	0.2	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Bromodichloromethane	---	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Carbon Disulfide	2.7	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Chloroform	0.3	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Isopropylbenzene	---	0.056 U	0.012 U	0.21	0.11 U	0.012 U	0.012 U
M/P-xylenes	---	0.056 U	0.012 U	0.58	0.11 U	0.012 U	0.012 U
Methylene Chloride	0.1	0.056 B J U	0.012 B J U	0.11 B J	0.11 B J U	0.012 B J U	0.0070 B J
n-Butylbenzene	---	0.056 U	0.012 U	0.53	0.080 J	0.012 U	0.012 U
n-Propylbenzene	---	0.056 U	0.012 U	0.12	0.11 U	0.012 U	0.012 U
o-Xylene	---	0.056 U	0.012 U	0.26	0.11 U	0.012 U	0.012 U
p-Cymene	---	0.056 U	0.012 U	0.64	0.090 J	0.012 U	0.012 U
sec-Butylbenzene	---	0.056 U	0.012 U	0.11 U	0.11 U	0.012 U	0.012 U
Styrene	---	0.056 U J	0.012 U J	0.11 U J	0.11 U J	0.012 U J	0.012 U
tert-Butylbenzene	---	0.12	0.012 U	0.77	0.11 U	0.012 U	0.012 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.37 U	0.40 U	26 D	11 D	0.41 U	0.41 U
Benzo(a)pyrene	0.061	0.37 U	0.40 U	13 D J	5	0.41 U	0.41 U
Benzo(b)fluoranthene	1.1	0.37 U	0.40 U	18 U	3	0.41 U	0.41 U
Benzo(k)fluoranthene	1.1	0.37 U	0.40 U	4.9	2.5	0.41 U	0.41 U
Chrysene	0.4	0.37 U	0.40 U	24 D	12 D	0.41 U	0.41 U
Dibenzo(a,h)anthracene	0.014	0.37 U	0.40 U	0.8	0.32 J	0.41 U	0.41 U
Indeno(1,2,3-cd)pyrene	3.2	0.37 U	0.40 U	1.9	0.64	0.41 U	0.41 U
Total Carcinogenic PAHs		0	0	70.6	34.46	0	0
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.11 J	0.40 U	140 D	15 D	0.41 U	0.41 U
Acenaphthene	50	0.37 U	0.40 U	110 D	52 D	0.41 U	0.41 U
Acenaphthylene	41	0.37 U	0.40 U	4.2	3.3	0.41 U	0.41 U
Anthracene	50	0.37 U	0.40 U	46 D	21 D	0.41 U	0.41 U
Benzo(g,h,i)perylene	50	0.37 U	0.40 U	2.8	0.9	0.41 U	0.41 U
Fluoranthene	50	0.37 U	0.40 U	44 D	19 D	0.41 U	0.41 U
Fluorene	50	0.37 U	0.40 U	52 D	24 D	0.41 U	0.41 U
Naphthalene	13	0.37 U	0.40 U	49 D	3.5	0.41 U	0.41 U
Phenanthrene	50	0.37 U	0.40 U	180 D	83	0.41 U	0.083 J
Pyrene	50	0.37 U	0.40 U	71 D	32	0.41 U	0.41 U
Total Non-Carcinogenic PAHs		0.11	0	699	253.7	0	0.083
Total PAHs		0.11	0	769.6	288.16	0	0.083

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-31 RSB-31(7.2-7.7) 4/2/03 7.2-7.7	RSB-31 RSB-31(16-20) 4/2/03 16-20	RSB-32 RSB-32(0-4) 4/2/03 0-4	RSB-32 RSB-32(4-8) 4/2/03 4-8	RSB-32 RSB-32(12-16) 4/2/03 12-16	RSB-32 RSB-32(24-28) 4/2/03 24-28
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.37 U	0.40 U	0.37 U	0.38 U	0.41 U	0.41 U
2-Nitrophenol	0.33	0.37 U	0.40 U	0.37 U	0.38 U	0.41 U	0.41 U
bis(2-Ethylhexyl)phthalate	50	0.37 U	0.40 U	1.4	0.38 U	0.41 U	0.41 U
Carbazole	---	0.37 U	0.40 U	0.37 U	0.38 U	0.41 U	0.41 U
Dibenzofuran	6.2	0.37 U	0.40 U	2.3	1.7	0.41 U	0.41 U
N-Nitrosodiphenylamine	---	0.37 U	0.40 U	0.37 U	0.38 U	0.41 U	0.41 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	0.36 U J	0.39 U J	0.71B J	0.37 U J	0.40 U J	0.39 U J
Barium	300	4.7B	2.7B	40.4	1.8B	1.8B	3.9B
Cadmium	1	0.034 U	0.036 U	0.11B U	0.034 U	0.037 U	0.037 U
Chromium	10	5.1	1.9	7.5	1.3	2.2	1.1B
Lead	500	9.7	0.82	14.7	0.79	0.72	0.71
Mercury	0.1	0.019 U J	0.020 U J	0.018 U J	0.019 U J	0.021 U J	0.021 U J
Selenium	2	0.72 J	0.46 U	1.0 J	0.44 U	0.47 U	0.47 U
Silver	---	0.11 U	0.12 U	0.11 U J	0.11 U	0.12 U	0.12 U
Cyanide (mg/kg)							
Cyanide	---	1.0 J	0.61 U	0.55 U	0.57 U	0.62 U	0.62 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-33 RSB-33/(8-12') 3/31/03 8-12	RSB-33 RSB-33/(16-20') 3/31/03 16-20	RSB-34 RSB-34/(6-8') 3/31/03 6-8	RSB-34 RSB-34/(10-12') 3/31/03 10-12	RSB-34 RSB-34/(24-28') 3/31/03 24-28	RSB-35 RSB-35(4-8) 4/2/03 4-8
Volatile Organic Compounds (mg/kg)							
BTEX							
Benzene	0.06	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Toluene	1.5	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Ethylbenzene	5.5	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Xylene (total)	1.2	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Total BTEX		0	0	0	0	0	0
Other Volatile Organic Compounds (mg/kg)							
1,1,2-Trichloroethane	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
1,2,4-Trimethylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.43
1,2,4,5-Tetramethylbenzene	---	0.011 U	0.012 U	0.45D J	0.012 U	0.012 U	0.49
1,3,5-Trimethylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.34
1,4-Diethylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Acetone	0.2	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Bromodichloromethane	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Carbon Disulfide	2.7	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Chloroform	0.3	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Isopropylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
M/P-xylenes	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Methylene Chloride	0.1	0.011 B J U	0.012 B J U	0.011 B J U	0.012 B J U	0.012 B J U	0.070 B J
n-Butylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.060 J
n-Propylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
o-Xylene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
p-Cymene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.090 J
sec-Butylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Styrene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
tert-Butylbenzene	---	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.11 U
Semivolatile Organic Compounds (mg/kg)							
Carcinogenic PAHs							
Benzo(a)anthracene	0.224	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	28 D J
Benzo(a)pyrene	0.061	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	15 D J
Benzo(b)fluoranthene	1.1	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	19 U J
Benzo(k)fluoranthene	1.1	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	19 U J
Chrysene	0.4	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	28 D J
Dibenzo(a,h)anthracene	0.014	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	1.3 J
Indeno(1,2,3-cd)pyrene	3.2	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	2.7 J
Total Carcinogenic PAHs		0	0	0	0	0	76
Non-Carcinogenic PAHs							
2-Methylnaphthalene	36.4	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	92 D
Acenaphthene	50	0.35 U	0.41 U	0.49	0.38 U	0.40 U	72 D
Acenaphthylene	41	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	87 J
Anthracene	50	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	58 D J
Benzo(g,h,i)perylene	50	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	3.9 J
Fluoranthene	50	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	54 D J
Fluorene	50	0.35 U	0.41 U	1.1	0.38 U	0.40 U	45 D J
Naphthalene	13	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	44 D
Phenanthrene	50	0.35 U	0.41 U	2.7	0.38 U	0.40 U	200 D J
Pyrene	50	0.35 U	0.41 U	0.67	0.38 U	0.40 U	88 D J
Total Non-Carcinogenic PAHs		0	0	4.96	0	0	744.9
Total PAHs		0	0	4.96	0	0	820.9

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft)					
		RSB-33 RSB-33/(8-12') 3/31/03 8-12	RSB-33 RSB-33/(16-20') 3/31/03 16-20	RSB-34 RSB-34/(6-8') 3/31/03 6-8	RSB-34 RSB-34/(10-12') 3/31/03 10-12	RSB-34 RSB-34/(24-28') 3/31/03 24-28	RSB-35 RSB-35(4-8) 4/2/03 4-8
Other Semivolatile Organic Compounds (mg/kg)							
1,2-Dichlorobenzene	7.9	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	0.38 U
2-Nitrophenol	0.33	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	0.38 U
bis(2-Ethylhexyl)phthalate	50	0.35 U	0.41 U	1.4	0.38 U	0.40 U	0.38 U J
Carbazole	---	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	0.38 U
Dibenzofuran	6.2	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	48 J
N-Nitrosodiphenylamine	---	0.35 U	0.41 U	0.37 U	0.38 U	0.40 U	0.38 U
Inorganic Compounds (mg/kg)							
Arsenic	7.5	0.14 U J	0.33B J U	0.13 U J	0.17B J U	0.15 U J	0.36 U J
Barium	300	1.8B	2.0B	2.2B	1.1B	2.3	4.2B
Cadmium	1	0.012 U J	0.016B J U	0.37B	0.012 U	0.012 U J	0.034 U
Chromium	10	2.0B	3.3B	2.2B	2.9B	1.9	3.3
Lead	500	1.1	1.1	2.8B	0.79	0.96	1.7
Mercury	0.1	0.018 U	0.021 U	0.02 U	0.02 U	0.02 U	0.019 U J
Selenium	2	0.24 U	0.27 U	0.25 U	0.25 U	0.27 U	0.43 U
Silver	---	0.043 U	0.049 U	0.045 U	0.046 U	0.048 U	0.11 U
Cyanide (mg/kg)							
Cyanide	---	0.5 U J	0.5 U J	0.5 U J	0.5 U J	0.5 U J	0.57 U

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

Constituent	NYS Recommended Soil Cleanup Objectives	Site ID/Sample ID/Date/Depth (ft) RSB-35 RSB-35(10-12) 4/2/03 10-12	RSB-35 RSB-35(12-16) 4/2/03 12-16	RSB-35 RSB-35(24-28) 4/2/03 24-28
Volatile Organic Compounds (mg/kg)				
BTEX				
Benzene	0.06	0.12 U	0.012 U	0.012 U
Toluene	1.5	0.12 U	0.0040 J	0.012 U
Ethylbenzene	5.5	0.12 U	0.012 U	0.012 U
Xylene (total)	1.2	0.12 U	0.012 U	0.012 U
Total BTEX		0	0.004	0
Other Volatile Organic Compounds (mg/kg)				
1,1,2-Trichloroethane	---	0.12 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	---	0.32	0.012 U	0.012 U
1,2,4,5-Tetramethylbenzene	---	1.9 J	0.012 U	0.012 U J
1,3,5-Trimethylbenzene	---	0.25	0.012 U	0.012 U
1,4-Diethylbenzene	---	1.8	0.012 U	0.012 U
Acetone	0.2	0.12 U J	0.012 U	0.012 U J
Bromodichloromethane	---	0.12 U	0.012 U	0.012 U
Carbon Disulfide	2.7	0.12 U	0.012 U	0.012 U
Chloroform	0.3	0.12 U	0.012 U	0.012 U
Isopropylbenzene	---	0.12 U	0.012 U	0.012 U
M/P-xylenes	---	0.12 U	0.012 U	0.012 U
Methylene Chloride	0.1	0.12 B J U	0.012 B J U	0.012 B J U
n-Butylbenzene	---	0.31	0.012 U	0.012 U
n-Propylbenzene	---	0.12 U	0.012 U	0.012 U
o-Xylene	---	0.12 U	0.012 U	0.012 U
p-Cymene	---	0.4	0.012 U	0.012 U
sec-Butylbenzene	---	0.12 U	0.012 U	0.012 U
Styrene	---	0.12 U	0.012 U	0.012 U
tert-Butylbenzene	---	0.12 U J	0.012 U	0.012 U J
Semivolatile Organic Compounds (mg/kg)				
Carcinogenic PAHs				
Benzo(a)anthracene	0.224	24 D	0.41 U	0.40 U
Benzo(a)pyrene	0.061	11 D J	0.41 U	0.40 U
Benzo(b)fluoranthene	1.1	8.2 J	0.41 U	0.40 U
Benzo(k)fluoranthene	1.1	6.1 J	0.41 U	0.40 U
Chrysene	0.4	23 D	0.41 U	0.40 U
Dibenzo(a,h)anthracene	0.014	0.75 J	0.41 U	0.40 U
Indeno(1,2,3-cd)pyrene	3.2	1.6 J	0.41 U	0.40 U
Total Carcinogenic PAHs		72.65	0	0
Non-Carcinogenic PAHs				
2-Methylnaphthalene	36.4	0.13 J	0.41 U	0.40 U
Acenaphthene	50	59 D	0.41 U	0.40 U
Acenaphthylene	41	11 D J	0.41 U	0.40 U
Anthracene	50	48 D	0.41 U	0.40 U
Benzo(g,h,i)perylene	50	2.3 J	0.41 U	0.40 U
Fluoranthene	50	46 D	0.41 U	0.40 U
Fluorene	50	43 D	0.41 U	0.40 U
Naphthalene	13	0.46	0.41 U	0.40 U
Phenanthrene	50	190 D	0.41 U	0.40 U
Pyrene	50	74 D	0.41 U	0.40 U
Total Non-Carcinogenic PAHs		473.89	0	0
Total PAHs		546.54	0	0

Table A1 – 22 Oak Street Property Soil Analytical Results

Table 5 (continued)
Soil Analytical Results
22 Oak Street Property
Bay Shore Former MGP Site

		Site ID/Sample ID/Date/Depth (ft)		
Constituent	NYS Recommended Soil Cleanup Objectives	RSB-35 RSB-35(10-12) 4/2/03 10-12	RSB-35 RSB-35(12-16) 4/2/03 12-16	RSB-35 RSB-35(24-28) 4/2/03 24-28
Other Semivolatile Organic Compounds (mg/kg)				
1,2-Dichlorobenzene	7.9	0.39 U	0.41 U	0.40 U
2-Nitrophenol	0.33	0.39 U	0.41 U	0.40 U
bis(2-Ethylhexyl)phthalate	50	0.39 U	0.41 U	0.40 U
Carbazole	---	0.39 U	0.41 U	0.40 U
Dibenzofuran	6.2	2.5	0.41 U	0.40 U
N-Nitrosodiphenylamine	---	0.39 U	0.41 U	0.40 U
Inorganic Compounds (mg/kg)				
Arsenic	7.5	0.38 U J	2.1 U	0.39 U
Barium	300	1.8B	1.1B	2.3B
Cadmium	1	0.036 U	0.037 U	0.036 U
Chromium	10	1.5	3.6	2
Lead	500	0.55	0.75	0.79
Mercury	0.1	0.02 U J	0.021 U	0.020 U
Selenium	2	0.45 U	0.47 U	0.46 U
Silver	---	0.12 U	0.12 U J	0.12 U J
Cyanide (mg/kg)				
Cyanide	---	0.60 U	0.62 U	0.60 U

Notes:

--- No Soil Cleanup Objective Established
NA Not Analyzed
U Not detected to the reporting limit for organic analysis and the method detection limit for inorganic analysis
J Estimated Value
B Compound also present in an associated blank sample
D Compound quantified in a secondary dilution run
N Spiked sample recovery was not within control limits (metals)
(Dup) Field duplicate sample submitted to the laboratory as a blind duplicate

Shading / bolding indicates exceedance of the NYSDEC Recommended Soil Cleanup Objectives

Volatile organic results were determined by EPA Method 8260
Semivolatile organic results were determined by EPA Method 8270

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		A1 (5-6)	A2 (11-12)	A2 (15-15.5)	A3 (10-11)	A3 (15-16)	A4 (5-6)	A4 (10.5-11.5)	A5 (15-16)
Sample Date		4/27/2010	4/27/2010	4/27/2010	4/27/2010	4/27/2010	4/28/2010	4/28/2010	4/27/2010
Analyte	Unrestricted SCO								
BTEX (mg/kg)									
Benzene	0.06	**0.001 J**	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Toluene	0.7	0.012 U	0.012 U	**0.004 J**	0.012 U	**0.002 J**	0.011 U	0.012 U	0.012 U
Ethylbenzene	1	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
m,p-Xylene	0.26	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
o-Xylene	0.26	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Total BTEX	NE	**0.001**	ND	**0.004**	ND	**0.002**	ND	ND	ND
Other VOCs (mg/kg)									
Acetaldehyde	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Acetone	0.05	**0.024**	**0.013**	**0.011 J**	**0.071**	**0.043**	**0.033**	**0.06**	0.004 U
2-Butanone (Methyl ethyl ketone)	0.12	**0.006 J**	**0.097**	**0.16**	0.012 U	**0.11**	**0.022**	**0.011 J**	0.012 U
Carbon disulfide	NE	**0.003 J**	**0.005 J**	**0.007 J**	0.012 U	**0.005 J**	**0.001 J**	**0.001 J**	0.012 U
Chlorobenzene	1.1	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,2-Dichlorobenzene	1.1	0.012 U	0.012 U	**0.014**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,3-Dichlorobenzene	2.4	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,4-Dichlorobenzene	1.8	0.012 U	0.012 U	**0.024**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,2-Dichloroethane	0.02	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
n-Heptane	NE	0.012 U	0.012 U	**0.019**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Hexachlorobutadiene	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
n-Hexane	NE	0.012 U	0.012 U	0.012 U	0.012 U	**0.004 J**	0.011 U	0.012 U	**0.005 J**
2-Hexanone	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Isopropyl benzene	NE	0.012 U	**0.003 J**	**0.029**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Methyl tert-butyl ether	0.93	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
4-Methyl-2-pentanone	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Methylene chloride	0.05	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.014 U
Naphthalene	12	**0.034**	**5**	**5.3**	**0.004 J**	**0.06**	**0.008 J**	**0.046**	0.012 U
2-Propanol (Isopropyl Alcohol)	NE	0.6 U	0.6 U	0.59 U	0.58 U	0.6 U	0.57 U	0.59 U	0.62 U
n-Propylbenzene	3.9	0.012 U	0.012 U	**0.01 J**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Styrene	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Tetrachloroethene	1.3	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,1,1-Trichloroethane	0.68	0.012 U	**0.004 J**	**0.014**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	3.6	**0.002 J**	**0.027**	**0.39 J**	**0.006 J**	**0.004 J**	0.011 U	**0.002 J**	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**0.003 J**	**0.035**	**0.33**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
2,2,4-Trimethylpentane	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Vinyl acetate	NE	0.012 U	0.012 U	**0.002 J**	0.012 U	0.012 U	0.011 U	0.012 U	0.012 U
Total VOCs	NE	**0.073**	**5.184**	**6.314**	**0.081**	**0.228**	**0.064**	**0.12**	**0.005**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		A1 (5-6)	A2 (11-12)	A2 (15-15.5)	A3 (10-11)	A3 (15-16)	A4 (5-6)	A4 (10.5-11.5)	A5 (15-16)
Sample Date		4/27/2010	4/27/2010	4/27/2010	4/27/2010	4/27/2010	4/28/2010	4/28/2010	4/27/2010
Analyte	Unrestricted SCO								
Non-carcinogenic PAHs (mg/kg)									
Acenaphthene	20	16 U	**3.1**	**92**	**77**	**21**	**0.18 J**	**140**	0.41 U
Acenaphthylene	100	16 U	**0.52 J**	**15 J**	**11 J**	**13**	0.38 U	**15 J**	0.41 U
Anthracene	100	**8.7 J**	**2.1**	**63**	**48**	**15**	**0.11 J**	**68**	0.41 U
Benzo[g,h,i]perylene	100	16 U	2 U	39 U	**4.8 J**	**4.7 J**	0.38 U	39 U	0.41 U
Fluoranthene	100	**17**	**4.1**	**87**	**59**	**29**	**0.36 J**	**92**	0.41 U
Fluorene	30	**8 J**	**2.1**	**73**	**67**	**21**	**0.14 J**	**74**	0.41 U
2-Methylnaphthalene	NE	16 U	2 U	39 U	19 U	9.8 U	0.38 U	39 U	0.41 U
Naphthalene	12	16 U	2 U	39 U	19 U	9.8 U	0.38 U	39 U	0.41 UJ
Phenanthrene	100	**60**	**13**	**300**	**230**	**93**	**0.46**	**350**	0.41 U
Pyrene	100	**27**	**6.1**	**130**	**92**	**42**	**0.47**	**130**	0.41 U
Total Non-carcinogenic PAHs	NE	**120.7**	**31.02**	**760**	**588.8**	**238.7**	**1.72**	**869**	ND
Carcinogenic PAHs (mg/kg)									
Benz[a]anthracene	1	**9.7 J**	**2.2**	**48**	**34**	**20**	**0.18 J**	**43**	0.41 U
Benzo[a]pyrene	1	**3.7 J**	**0.98 J**	**25 J**	**14 J**	**10**	**0.12 J**	**23 J**	0.41 U
Benzo[b]fluoranthene	1	16 U	**0.7 J**	**16 J**	**10 J**	**8.4 J**	**0.083 J**	**8.4 J**	0.41 U
Benzo[k]fluoranthene	0.8	16 U	2 U	39 U	**6 J**	**4 J**	**0.15 J**	**17 J**	0.41 UJ
Chrysene	1	**9 J**	**2**	**44**	**36**	**21**	**0.24 J**	**52**	0.41 U
Dibenz[a,h]anthracene	0.33	16 U	2 U	39 U	19 U	9.8 U	0.38 U	39 U	0.41 U
Indeno[1,2,3-cd]pyrene	0.5	16 U	2 U	39 U	19 U	**3.4 J**	0.38 U	39 U	0.41 U
Total Carcinogenic PAHs	NE	**22.4**	**5.88**	**133**	**100**	**66.8**	**0.773**	**143.4**	ND
Total PAHs (mg/kg)									
Total PAHs	NE	**143.1**	**36.9**	**893**	**688.8**	**305.5**	**2.493**	**1012.4**	ND
Other SVOCs (mg/kg)									
Bis(2-ethylhexyl)phthalate	NE	16 U	2 U	39 U	19 U	9.8 U	0.38 U	39 U	0.41 U
Dibenzofuran	7	16 U	2 U	39 U	**6.6 J**	9.8 U	0.38 U	39 U	0.41 U
Diethyl phthalate	NE	16 U	2 U	39 U	19 U	9.8 U	0.38 U	39 U	0.41 U
Phenol	0.33	16 U	2 U	39 U	19 U	9.8 U	0.38 U	39 U	0.41 U
Total SVOCs	NE	**143.1**	**36.9**	**893**	**695.4**	**305.5**	**2.493**	**1012.4**	ND
Other									
Percent Moisture *(%)*	NE	**16.3**	**16.1**	**15.1**	**13.5**	**16**	**12.9**	**14.6**	**19.2**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**1600**	200 U	**6400**	**4500**	**2800**	190 U	**6200**	8.3 U

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**B2 (11.5-12)**	**B3 (11.25-11.75)**	**B5 (15-16)**	**C2 (10.5+12)**	**C2 (15-16)**	**C4 (17.25-17.75)**
Sample Date		4/21/2010	4/21/2010	4/12/2010	4/21/2010	4/21/2010	4/13/2010
Analyte	Unrestricted SCO						
BTEX (mg/kg)							
Benzene	0.06	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Toluene	0.7	0.056 U	0.059 U	0.012 U	**0.012 J**	**0.019 J**	0.012 U
Ethylbenzene	1	**0.013 J**	0.059 U	0.012 U	**0.53**	0.057 U	0.012 U
m,p-Xylene	0.26	0.056 U	0.059 U	0.012 U	**0.064**	0.057 U	0.012 U
o-Xylene	0.26	0.056 U	0.059 U	0.012 U	**0.25**	0.057 U	0.012 U
Total BTEX	NE	**0.013**	ND	ND	**0.856**	**0.019**	ND
Other VOCs (mg/kg)							
Acetaldehyde	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Acetone	0.05	0.056 U	0.059 U	0.012 U	0.059 U	0.089 U	0.018 U
2-Butanone (Methyl ethyl ketone)	0.12	0.056 U	**0.013 J**	0.012 U	**0.027 J**	**0.049 J**	**0.003 J**
Carbon disulfide	NE	**0.021 J**	0.059 U	0.012 U	**0.008 J**	**0.022 J**	**0.002 J**
Chlorobenzene	1.1	0.056 U	0.059 U	0.012 U	**0.011 J**	0.057 U	0.012 U
1,2-Dichlorobenzene	1.1	**0.012 J**	0.059 U	0.012 U	**0.12**	**0.037 J**	0.012 U
1,3-Dichlorobenzene	2.4	0.056 U	0.059 U	0.012 U	**0.015 J**	0.057 U	0.012 U
1,4-Dichlorobenzene	1.8	0.056 U	0.059 U	0.012 U	**0.063**	**0.13**	**0.004 J**
1,2-Dichloroethane	0.02	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
n-Heptane	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Hexachlorobutadiene	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
n-Hexane	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
2-Hexanone	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Isopropyl benzene	NE	**0.14**	**0.064**	0.012 U	**0.51**	**0.066**	0.012 U
Methyl tert-butyl ether	0.93	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
4-Methyl-2-pentanone	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Methylene chloride	0.05	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Naphthalene	12	**2.6**	**11**	0.012 U	**65**	**2**	**0.053**
2-Propanol (Isopropyl Alcohol)	NE	2.8 U	3 U	0.59 U	3 U	2.9 U	**0.033 J**
n-Propylbenzene	3.9	**0.047 J**	**0.042 J**	0.012 U	**0.31**	**0.025 J**	0.012 U
Styrene	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Tetrachloroethene	1.3	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
1,1,1-Trichloroethane	0.68	**0.019 J**	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
1,2,4-Trimethylbenzene	3.6	**1.3 J**	**1.1 J**	0.012 U	**1.5 J**	**0.73**	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**1.9**	**2.1**	0.012 U	**6.4 J**	**1.2**	0.012 U
2,2,4-Trimethylpentane	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Vinyl acetate	NE	0.056 U	0.059 U	0.012 U	0.059 U	0.057 U	0.012 U
Total VOCs	NE	**6.052**	**14.319**	ND	**74.82**	**4.278**	**0.095**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		B2 (11.5-12)	B3 (11.25-11.75)	B5 (15-16)	C2 (10.5+12)	C2 (15-16)	C4 (17.25-17.75)
Sample Date		4/21/2010	4/21/2010	4/12/2010	4/21/2010	4/21/2010	4/13/2010
Analyte	Unrestricted SCO						
Non-carcinogenic PAHs (mg/kg)							
Acenaphthene	20	**180**	**31**	0.39 U	**78**	**170**	**34**
Acenaphthylene	100	**31 J**	**3.2**	0.39 U	**7.9 J**	**49 J**	**97 J**
Anthracene	100	**180**	**22**	0.39 U	**74**	**160**	**260**
Benzo[g,h,i]perylene	100	**2.1 J**	**0.79**	0.39 U	**1.3 J**	**4.2 J**	**9.5**
Fluoranthene	100	**190**	**20**	0.39 U	**47**	**150**	**310**
Fluorene	30	**130**	**20**	0.39 U	**46**	**130**	**270**
2-Methylnaphthalene	NE	**7.7 J**	**0.18 J**	0.39 U	**48**	**4.8**	**11**
Naphthalene	12	**2 J**	**0.093 J**	0.39 U	**9.1 J**	**0.93**	3.9 U
Phenanthrene	100	**540**	**86**	**0.17 J**	**200**	**620**	**1000**
Pyrene	100	**230**	**29**	0.39 U	**66**	**220**	**440**
Total Non-carcinogenic PAHs	NE	**1492.8**	**212.263**	**0.17**	**577.3**	**1508.93**	**2431.5**
Carcinogenic PAHs (mg/kg)							
Benz[a]anthracene	1	**95**	**11**	0.39 U	**24**	**89**	**170 J**
Benzo[a]pyrene	1	**57**	**5.2**	0.39 U	**12 J**	**43 J**	**92 J**
Benzo[b]fluoranthene	1	**43**	**4**	0.39 U	**8.9 J**	**30 J**	**51**
Benzo[k]fluoranthene	0.8	**19 J**	**1.5**	0.39 UJ	**4.7 J**	**8.1 J**	**34 J**
Chrysene	1	**97**	**9.5**	0.39 U	**23**	**74 J**	**180 J**
Dibenz[a,h]anthracene	0.33	**1.2 J**	**0.37 J**	0.39 U	**0.64 J**	**1.9 J**	**6.6**
Indeno[1,2,3-cd]pyrene	0.5	**1.8 J**	**0.74**	0.39 U	**1.4 J**	**3.8 J**	**9.7**
Total Carcinogenic PAHs	NE	**314**	**32.31**	ND	**74.64**	**249.8**	**543.3**
Total PAHs (mg/kg)							
Total PAHs	NE	**1806.8**	**244.573**	**0.17**	**651.94**	**1758.73**	**2974.8**
Other SVOCs (mg/kg)							
Bis(2-ethylhexyl)phthalate	NE	**0.43 J**	0.39 U	**0.23 J**	0.39 UJ	0.38 UJ	3.9 U
Dibenzofuran	7	**15 J**	**1.4**	0.39 U	**3.1**	**5.3**	**17**
Diethyl phthalate	NE	0.37 U	0.39 U	0.39 U	0.39 U	0.38 U	3.9 U
Phenol	0.33	0.37 U	0.39 U	0.39 U	0.39 U	0.38 U	3.9 U
Total SVOCs	NE	**1822.23**	**245.973**	**0.4**	**655.04**	**1764.03**	**2991.8**
Other							
Percent Moisture *(%)*	NE	**10.7**	**15.8**	**15.7**	**15.5**	**12.5**	**14.8**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**13000**	**1700**	7.9 U	**3200**	**9700**	**19000**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		C5 (21-21.5)	D3 (6.5-7.5)	D3 (12-12.5)	D4 (16-16.5)	D5 (16.5-17)	D5 (21-22.5)	D6 (15-16)
Sample Date		4/13/2010	4/21/2010	4/21/2010	4/14/2010	4/14/2010	4/14/2010	4/14/2010
Analyte	Unrestricted SCO							
BTEX (mg/kg)								
Benzene	0.06	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Toluene	0.7	0.012 U	0.053 U	**0.012 J**	0.011 U	0.012 U	0.012 U	0.012 U
Ethylbenzene	1	0.012 U	0.053 U	**0.067**	0.011 U	0.012 U	0.012 U	0.012 U
m,p-Xylene	0.26	0.012 U	0.053 U	**0.046 J**	0.011 U	0.012 U	0.012 U	0.012 U
o-Xylene	0.26	0.012 U	0.053 U	**0.078**	0.011 U	0.012 U	0.012 U	0.012 U
Total BTEX	NE	ND	ND	**0.203**	ND	ND	ND	ND
Other VOCs (mg/kg)								
Acetaldehyde	NE	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Acetone	0.05	0.012 U	0.053 U	0.057 U	**0.08**	0.012 U	0.012 U	0.012 U
2-Butanone (Methyl ethyl ketone)	0.12	**0.001 J**	**0.019 J**	**0.039 J**	**0.003 J**	0.012 U	0.012 U	0.012 U
Carbon disulfide	NE	0.012 U	0.053 U	0.057 U	**0.005 J**	0.012 U	0.012 U	0.012 U
Chlorobenzene	1.1	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
1,2-Dichlorobenzene	1.1	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
1,3-Dichlorobenzene	2.4	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
1,4-Dichlorobenzene	1.8	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
1,2-Dichloroethane	0.02	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
n-Heptane	NE	0.012 U	0.053 U	**0.12**	0.011 U	0.012 U	0.012 U	0.012 U
Hexachlorobutadiene	NE	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
n-Hexane	NE	0.012 U	0.053 U	**0.02 J**	**0.002 J**	0.012 U	0.012 U	0.012 U
2-Hexanone	NE	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Isopropyl benzene	NE	0.012 U	0.053 U	**2.5 J**	**0.044**	0.012 U	0.012 U	0.012 U
Methyl tert-butyl ether	0.93	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
4-Methyl-2-pentanone	NE	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Methylene chloride	0.05	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Naphthalene	12	**0.003 J**	**1.3**	**560**	**0.003 J**	**0.024**	**0.028 J**	**0.003 J**
2-Propanol (Isopropyl Alcohol)	NE	0.61 U	2.7 U	2.9 U	0.56 U	0.6 U	0.62 U	0.61 U
n-Propylbenzene	3.9	0.012 U	0.053 U	**0.81**	0.011 U	0.012 U	0.012 U	0.012 U
Styrene	NE	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Tetrachloroethene	1.3	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
1,1,1-Trichloroethane	0.68	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	3.6	0.012 U	**0.015 J**	**21 J**	**0.007 J**	**0.002 J**	**0.006 J**	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	0.012 U	0.053 U	**20 J**	**0.003 J**	0.012 U	0.012 U	0.012 U
2,2,4-Trimethylpentane	NE	0.012 U	0.053 U	0.057 U	0.011 U	**0.005 J**	**0.017**	0.012 U
Vinyl acetate	NE	0.012 U	0.053 U	0.057 U	0.011 U	0.012 U	0.012 U	0.012 U
Total VOCs	NE	**0.004**	**1.334**	**604.692**	**0.147**	**0.031**	**0.051**	**0.003**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		C5 (21-21.5)	D3 (6.5-7.5)	D3 (12-12.5)	D4 (16-16.5)	D5 (16.5-17)	D5 (21-22.5)	D6 (15-16)
Sample Date		4/13/2010	4/21/2010	4/21/2010	4/14/2010	4/14/2010	4/14/2010	4/14/2010
Analyte	Unrestricted SCO							
Non-carcinogenic PAHs (mg/kg)								
Acenaphthene	20	0.4 U	**0.66**	**40**	**220**	**8.8**	**0.63 J**	0.41 U
Acenaphthylene	100	0.4 U	**0.36**	**3.7**	**36**	**15**	**2.1**	0.41 U
Anthracene	100	0.4 U	**0.79**	**19**	**150**	**83**	**9.4**	0.41 U
Benzo[g,h,i]perylene	100	0.4 U	**0.17 J**	**0.63 J**	**7 J**	**3.1 J**	**0.44 J**	0.41 U
Fluoranthene	100	**0.12 J**	**1.7**	**32**	**170**	**96**	**11**	0.41 U
Fluorene	30	0.4 U	**0.44**	**27**	**150**	**21**	**5 J**	0.41 U
2-Methylnaphthalene	NE	0.4 U	**0.085 J**	**57**	**3.9**	**3.6 J**	0.4 UJ	0.41 U
Naphthalene	12	0.4 U	0.35 UJ	**44**	**3.8**	4 U	0.4 U	0.41 U
Phenanthrene	100	**0.11 J**	**1.5**	**100**	**540**	**310**	**33**	0.41 U
Pyrene	100	**0.2 J**	**2.7**	**38**	**210**	**140**	**16**	0.41 U
Total Non-carcinogenic PAHs	NE	**0.43**	**8.405**	**361.33**	**1490.7**	**680.5**	**77.57**	ND
Carcinogenic PAHs (mg/kg)								
Benz[a]anthracene	1	**0.11 J**	**1.5**	**16**	**100**	**45**	**5 J**	0.41 U
Benzo[a]pyrene	1	0.4 U	**0.81**	**6 J**	**44 J**	**28**	**3 J**	0.41 U
Benzo[b]fluoranthene	1	0.4 U	**0.39**	**4.4 J**	**36 J**	**21**	**2.4 J**	0.41 U
Benzo[k]fluoranthene	0.8	0.4 UJ	**0.48 J**	**5.7 J**	**36 J**	**11 J**	**1.7 J**	0.41 UJ
Chrysene	1	**0.15 J**	**1.4**	**15**	**120**	**39**	**4.9 J**	0.41 U
Dibenz[a,h]anthracene	0.33	0.4 U	**0.11 J**	**0.44 J**	**4.5 J**	**2.2 J**	**0.25 J**	0.41 U
Indeno[1,2,3-cd]pyrene	0.5	0.4 U	**0.14 J**	**0.63 J**	**5.7 J**	**3.4 J**	**0.33 J**	0.41 U
Total Carcinogenic PAHs	NE	**0.26**	**4.83**	**48.17**	**346.2**	**149.6**	**17.58**	ND
Total PAHs (mg/kg)								
Total PAHs	NE	**0.69**	**13.235**	**409.5**	**1836.9**	**830.1**	**95.15**	ND
Other SVOCs (mg/kg)								
Bis(2-ethylhexyl)phthalate	NE	0.4 U	**0.15 J**	**0.3 J**	**6.3**	4 U	**0.15 J**	0.41 U
Dibenzofuran	7	0.4 U	0.35 U	**2.2**	**11**	**4.5**	**0.43**	0.41 U
Diethyl phthalate	NE	0.4 U	0.35 U	0.38 U	3.7 U	4 U	0.4 U	0.41 U
Phenol	0.33	0.4 U	0.35 U	0.38 U	3.7 U	4 U	0.4 U	0.41 U
Total SVOCs	NE	**0.69**	**13.385**	**412**	**1854.2**	**834.6**	**95.73**	ND
Other								
Percent Moisture *(%)*	NE	**17.8**	**6.3**	**12.8**	**11.4**	**16.8**	**19.7**	**18.6**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**38**	**260**	**3200**	**11000**	**730**	**1700 J**	**41**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		E4 (20-21)	E5 (15.5-16.5)	E5 (21.5-22)	E6 (16-16.5)	F1 (7.5-8)	F2 (7-8)	F2 (12-12.5)
Sample Date		4/15/2010	4/15/2010	4/15/2010	4/15/2010	4/20/2010	4/20/2010	4/20/2010
Analyte	Unrestricted SCO							
BTEX (mg/kg)								
Benzene	0.06	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Toluene	0.7	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Ethylbenzene	1	**0.003 J**	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	**0.13**
m,p-Xylene	0.26	0.012 UJ	0.012 UJ	0.012 U	0.012 U	0.012 U	0.12 UJ	**0.044 J**
o-Xylene	0.26	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	**0.065**
Total BTEX	NE	**0.003**	ND	ND	ND	ND	ND	**0.239**
Other VOCs (mg/kg)								
Acetaldehyde	NE	**0.042 J**	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Acetone	0.05	**0.029 J**	0.012 U	**0.025**	0.012 U	0.016 U	0.12 UJ	0.058 U
2-Butanone (Methyl ethyl ketone)	0.12	**0.004 J**	0.012 U	0.012 U	0.012 U	**0.002 J**	0.12 UJ	**0.015 J**
Carbon disulfide	NE	**0.021 J**	0.012 U	**0.003 J**	0.012 U	0.012 U	0.12 UJ	**0.028 J**
Chlorobenzene	1.1	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
1,2-Dichlorobenzene	1.1	**0.094 J**	0.012 U	**0.058 J**	0.012 U	0.012 U	0.12 UJ	0.058 U
1,3-Dichlorobenzene	2.4	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	**0.034 J**	0.058 U
1,4-Dichlorobenzene	1.8	**0.067 J**	0.012 U	**0.041 J**	0.012 U	0.012 U	**0.076 J**	0.058 U
1,2-Dichloroethane	0.02	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
n-Heptane	NE	**0.018 J**	0.012 U	**0.021 J**	0.012 U	0.012 U	0.12 UJ	**0.053 J**
Hexachlorobutadiene	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
n-Hexane	NE	0.012 U	0.012 U	**0.001 J**	0.012 U	0.012 U	**0.053 J**	**0.009 J**
2-Hexanone	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Isopropyl benzene	NE	**0.11 J**	0.012 U	**0.02 J**	0.012 U	0.012 U	**0.11 J**	**0.46**
Methyl tert-butyl ether	0.93	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
4-Methyl-2-pentanone	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Methylene chloride	0.05	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Naphthalene	12	**84**	**0.049**	**31**	**0.005 J**	0.012 U	0.12 UJ	**110**
2-Propanol (Isopropyl Alcohol)	NE	0.58 U	0.59 U	0.59 U	0.59 U	0.58 U	5.8 UJ	2.9 U
n-Propylbenzene	3.9	**0.039 J**	0.012 U	**0.035 J**	0.012 U	0.012 U	**0.22 J**	**0.15**
Styrene	NE	**0.006 J**	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Tetrachloroethene	1.3	**0.006 J**	0.012 U	**0.11 J**	0.012 U	0.012 U	0.12 UJ	0.058 U
1,1,1-Trichloroethane	0.68	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
1,2,4-Trimethylbenzene	3.6	**8.4**	0.012 U	**1.4 J**	0.012 U	0.012 U	**0.66 J**	**6 J**
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**9.3**	0.012 U	**1.1 J**	0.012 U	0.012 U	**0.074 J**	**7.9 J**
2,2,4-Trimethylpentane	NE	0.012 U	**0.017**	**0.013 J**	0.012 U	0.012 U	0.12 UJ	0.058 U
Vinyl acetate	NE	0.012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.12 UJ	0.058 U
Total VOCs	NE	**102.139**	**0.066**	**33.827**	**0.005**	**0.002**	**1.227**	**124.854**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		E4 (20-21)	E5 (15.5-16.5)	E5 (21.5-22)	E6 (16-16.5)	F1 (7.5-8)	F2 (7-8)	F2 (12-12.5)
Sample Date		4/15/2010	4/15/2010	4/15/2010	4/15/2010	4/20/2010	4/20/2010	4/20/2010
Analyte	Unrestricted SCO							
Non-carcinogenic PAHs (mg/kg)								
Acenaphthene	20	**140**	**1.4**	**3.4**	0.39 U	0.38 U	**0.088 J**	**11**
Acenaphthylene	100	**30 J**	**3.7**	**60**	0.39 U	0.38 U	0.38 U	**1.2**
Anthracene	100	**120**	**17**	**83**	**0.17 J**	0.38 U	0.38 U	**6**
Benzo[g,h,i]perylene	100	**1.9 J**	**1.1 J**	**2 J**	0.39 U	0.38 U	0.38 U	**0.36 J**
Fluoranthene	100	**120**	**27**	**92**	**0.15 J**	0.38 U	0.38 U	**8.4**
Fluorene	30	**130**	**12**	**100**	0.39 U	0.38 U	**0.084 J**	**5.3**
2-Methylnaphthalene	NE	**9 J**	**1.6**	**84**	0.39 U	0.38 U	0.38 U	**3.5**
Naphthalene	12	**6.3 J**	0.39 U	**4.4**	0.39 UJ	0.38 UJ	0.38 UJ	**2.9 J**
Phenanthrene	100	**410**	**60**	**310**	**0.18 J**	**0.12 J**	0.38 U	**24**
Pyrene	100	**160**	**40**	**120**	**0.28 J**	0.38 U	0.38 U	**11**
Total Non-carcinogenic PAHs	NE	**1127.2**	**163.8**	**858.8**	**0.78**	**0.12**	**0.172**	**73.66**
Carcinogenic PAHs (mg/kg)								
Benz[a]anthracene	1	**63**	**20**	**51**	**0.26 J**	0.38 U	0.38 U	**4.1**
Benzo[a]pyrene	1	**35 J**	**10**	**29 J**	**0.15 J**	0.38 U	0.38 U	**2.3**
Benzo[b]fluoranthene	1	**15 J**	**5.4 J**	**14 J**	0.39 U	0.38 U	0.38 U	**1.4**
Benzo[k]fluoranthene	0.8	**22 J**	**4.2 J**	**12 J**	**0.098 J**	0.38 U	0.38 U	**1.4**
Chrysene	1	**65**	**19**	**51**	**0.49**	0.38 U	0.38 U	**4.1**
Dibenz[a,h]anthracene	0.33	**1.3 J**	**0.78 J**	**2.1 J**	0.39 U	0.38 U	0.38 U	**0.23 J**
Indeno[1,2,3-cd]pyrene	0.5	**1.9 J**	**1.2 J**	**2.4 J**	0.39 U	0.38 U	0.38 U	**0.29 J**
Total Carcinogenic PAHs	NE	**203.2**	**60.58**	**161.5**	**0.998**	ND	ND	**13.82**
Total PAHs (mg/kg)								
Total PAHs	NE	**1330.4**	**224.38**	**1020.3**	**1.778**	**0.12**	**0.172**	**87.48**
Other SVOCs (mg/kg)								
Bis(2-ethylhexyl)phthalate	NE	0.38 UJ	**0.15 J**	**0.34 J**	0.39 U	0.38 U	0.38 U	**0.093 J**
Dibenzofuran	7	**14 J**	**0.81**	**9.2 J**	0.39 U	0.38 U	0.38 U	**0.64**
Diethyl phthalate	NE	0.38 U	0.39 U	0.39 U	0.39 U	0.38 U	0.38 U	0.38 U
Phenol	0.33	0.38 U	0.39 U	0.39 U	0.39 U	0.38 U	0.38 U	0.38 U
Total SVOCs	NE	**1344.4**	**225.34**	**1029.84**	**1.778**	**0.12**	**0.172**	**88.213**
Other								
Percent Moisture *(%)*	NE	**13.3**	**15.8**	**15.5**	**15.8**	**14**	**14**	**13.3**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**7100**	**1900**	**8500**	**58**	7.8 U	**800**	**840**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		F4 (15.25-15.5+16.25)	F6 (16.5+17.5)	F6 (22.5-23)	G3 (10-11.5)	G5 (15-16.5)	G6 (20-20.5)
Sample Date		4/16/2010	4/19/2010	4/19/2010	4/20/2010	4/19/2010	4/19/2010
Analyte	Unrestricted SCO						
BTEX (mg/kg)							
Benzene	0.06	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Toluene	0.7	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Ethylbenzene	1	**0.056 J**	0.012 U	0.012 U	0.012 U	0.059 U	**0.04 J**
m,p-Xylene	0.26	**0.13 J**	0.012 U	0.012 U	0.012 U	0.059 U	**1.2**
o-Xylene	0.26	**0.18 J**	0.012 U	0.012 U	0.012 U	0.059 U	**0.77**
Total BTEX	NE	**0.366**	ND	ND	ND	ND	**2.01**
Other VOCs (mg/kg)							
Acetaldehyde	NE	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Acetone	0.05	**0.23 J**	**0.022**	**0.035**	0.012 U	0.084 U	0.058 U
2-Butanone (Methyl ethyl ketone)	0.12	**0.022 J**	**0.003 J**	**0.003 J**	0.012 U	**0.01 J**	**0.013 J**
Carbon disulfide	NE	**0.078 J**	0.012 U	0.012 U	0.012 U	0.059 U	**0.01 J**
Chlorobenzene	1.1	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
1,2-Dichlorobenzene	1.1	**0.079 J**	0.012 U	0.012 U	0.012 U	**0.036 J**	**0.064**
1,3-Dichlorobenzene	2.4	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
1,4-Dichlorobenzene	1.8	**0.11 J**	0.012 U	0.012 U	0.012 U	**0.029 J**	**0.041 J**
1,2-Dichloroethane	0.02	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
n-Heptane	NE	**0.066 J**	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Hexachlorobutadiene	NE	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
n-Hexane	NE	0.056 U	**0.002 J**	**0.005 J**	0.012 U	0.059 U	0.058 U
2-Hexanone	NE	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Isopropyl benzene	NE	**2.2 J**	0.012 U	0.012 U	0.012 U	**0.031 J**	**0.48**
Methyl tert-butyl ether	0.93	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
4-Methyl-2-pentanone	NE	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Methylene chloride	0.05	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Naphthalene	12	**200**	**0.005 J**	**0.004 J**	**0.05**	**7**	**960**
2-Propanol (Isopropyl Alcohol)	NE	2.8 U	0.58 U	0.61 U	0.59 U	2.9 U	2.9 U
n-Propylbenzene	3.9	**0.96 J**	0.012 U	0.012 U	0.012 U	**0.015 J**	**0.3**
Styrene	NE	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	**0.17**
Tetrachloroethene	1.3	**0.3 J**	0.012 U	0.012 U	0.012 U	0.059 U	**0.1**
1,1,1-Trichloroethane	0.68	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
1,2,4-Trimethylbenzene	3.6	**9.6 J**	0.012 U	0.012 U	0.012 U	**0.5**	**45 J**
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**13 J**	0.012 U	0.012 U	0.012 U	**0.58**	**41 J**
2,2,4-Trimethylpentane	NE	0.056 U	**0.001 J**	0.012 U	0.012 U	0.059 U	0.058 U
Vinyl acetate	NE	0.056 U	0.012 U	0.012 U	0.012 U	0.059 U	0.058 U
Total VOCs	NE	**227.011**	**0.033**	**0.047**	**0.05**	**8.201**	**1049.188**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		F4 (15.25-15.5+16.25)	F6 (16.5+17.5)	F6 (22.5-23)	G3 (10-11.5)	G5 (15-16.5)	G6 (20-20.5)
Sample Date		4/16/2010	4/19/2010	4/19/2010	4/20/2010	4/19/2010	4/19/2010
Analyte	Unrestricted SCO						
Non-carcinogenic PAHs (mg/kg)							
Acenaphthene	20	**870**	**13 J**	**0.09 J**	0.39 U	**98**	**190**
Acenaphthylene	100	**96 J**	**16 J**	**0.33 J**	0.39 U	**23**	**120**
Anthracene	100	**470**	**37 J**	0.4 U	0.39 U	**63**	**190**
Benzo[g,h,i]perylene	100	**11 J**	**1.7 J**	0.4 U	0.39 U	**0.62 J**	**5.3**
Fluoranthene	100	**440**	**87**	**3.9**	0.39 U	**49**	**150**
Fluorene	30	**520**	**19 J**	**0.67**	0.39 U	**76**	**240**
2-Methylnaphthalene	NE	**240**	**0.22 J**	0.4 U	0.39 U	0.39 U	**270**
Naphthalene	12	**240 J**	**0.11 J**	0.4 UJ	0.39 U	**5.9 J**	**61 J**
Phenanthrene	100	**1700**	**300**	**12**	0.39 U	**210**	**620**
Pyrene	100	**640**	**140**	**4.1**	0.39 U	**80**	**230**
Total Non-carcinogenic PAHs	NE	**5227**	**614.03**	**21.09**	ND	**605.52**	**2076.3**
Carcinogenic PAHs (mg/kg)							
Benz[a]anthracene	1	**230**	**51**	**1.4**	0.39 U	**29**	**90**
Benzo[a]pyrene	1	**100 J**	**15 J**	**0.66**	0.39 U	**12 J**	**41**
Benzo[b]fluoranthene	1	**67 J**	**14 J**	**0.56**	0.39 U	**5.7 J**	**28**
Benzo[k]fluoranthene	0.8	**59 J**	**14 J**	**0.81**	0.39 U	**10 J**	**20**
Chrysene	1	**230**	**56**	**2.6**	0.39 U	**29**	**92**
Dibenz[a,h]anthracene	0.33	**8.1 J**	**1.3 J**	**0.11 J**	0.39 U	**0.71 J**	**3.9**
Indeno[1,2,3-cd]pyrene	0.5	**9.3 J**	**1.5 J**	**0.14 J**	0.39 U	**0.79 J**	**5.2**
Total Carcinogenic PAHs	NE	**703.4**	**152.8**	**6.28**	ND	**87.2**	**280.1**
Total PAHs (mg/kg)							
Total PAHs	NE	**5930.4**	**766.83**	**27.37**	ND	**692.72**	**2356.4**
Other SVOCs (mg/kg)							
Bis(2-ethylhexyl)phthalate	NE	3.7 U	**1.7 J**	**0.13 J**	0.39 U	0.39 UJ	3.8 U
Dibenzofuran	7	**48 J**	**2.1**	**0.091 J**	0.39 U	**6**	**22**
Diethyl phthalate	NE	3.7 U	0.38 U	0.4 U	0.39 U	0.39 U	3.8 U
Phenol	0.33	3.7 U	0.38 U	0.4 U	0.39 U	0.39 U	3.8 U
Total SVOCs	NE	**5978.4**	**770.63**	**27.591**	ND	**698.72**	**2378.4**
Other							
Percent Moisture *(%)*	NE	**10.2**	**13.5**	**18.5**	**15.6**	**14.6**	**13.6**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**18000**	**4700**	**390**	7.9 U	**6000**	**19000**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		G7 (16.5-17)	G7 (26.25-27.25)	H5 (12.5-13)	H6 (15.5-16.5)	H6 (20-21)	H7 (16-16.5)
Sample Date		4/22/2010	4/22/2010	4/19/2010	4/21/2010	4/21/2010	4/22/2010
Analyte	Unrestricted SCO						
BTEX (mg/kg)							
Benzene	0.06	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Toluene	0.7	**0.004 J**	0.057 U	0.06 U	0.12 U	0.058 U	**0.011 J**
Ethylbenzene	1	0.011 U	**0.044 J**	0.06 U	0.12 U	0.058 U	0.058 U
m,p-Xylene	0.26	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
o-Xylene	0.26	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Total BTEX	NE	**0.004**	**0.044**	ND	ND	ND	**0.011**
Other VOCs (mg/kg)							
Acetaldehyde	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Acetone	0.05	0.008 U	0.022 U	**0.12**	0.074 U	0.057 U	**0.023 J**
2-Butanone (Methyl ethyl ketone)	0.12	0.011 U	0.057 U	**0.02 J**	**0.026 J**	**0.035 J**	0.058 U
Carbon disulfide	NE	0.011 U	0.057 U	**0.008 J**	0.12 U	0.058 U	**0.009 J**
Chlorobenzene	1.1	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
1,2-Dichlorobenzene	1.1	0.011 U	**0.32 J**	**0.42**	**0.41**	**0.24**	**0.39 J**
1,3-Dichlorobenzene	2.4	0.011 U	**0.03 J**	0.06 U	0.12 U	0.058 U	0.058 U
1,4-Dichlorobenzene	1.8	0.011 U	**0.22 J**	**0.2**	**0.18**	**0.15**	**0.19 J**
1,2-Dichloroethane	0.02	0.011 U	0.057 U	0.06 U	0.12 U	**0.027 J**	0.058 U
n-Heptane	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Hexachlorobutadiene	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
n-Hexane	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
2-Hexanone	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Isopropyl benzene	NE	0.011 U	**0.046 J**	**0.031 J**	**0.13**	0.058 U	0.058 U
Methyl tert-butyl ether	0.93	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
4-Methyl-2-pentanone	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Methylene chloride	0.05	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Naphthalene	12	**0.037**	**21**	**1.3 J**	**41**	**5.9**	**0.29 J**
2-Propanol (Isopropyl Alcohol)	NE	0.57 U	2.9 U	3 U	5.9 U	2.9 U	2.9 U
n-Propylbenzene	3.9	0.011 U	**0.16 J**	**0.029 J**	**0.12**	**0.029 J**	**0.031 J**
Styrene	NE	0.011 U	**0.03 J**	0.06 U	0.12 U	0.058 U	0.058 U
Tetrachloroethene	1.3	0.011 U	**0.91 J**	**0.01 J**	0.12 U	**0.011 J**	0.058 U
1,1,1-Trichloroethane	0.68	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
1,2,4-Trimethylbenzene	3.6	0.011 U	**1.1 J**	**0.61**	**2.9 J**	**0.72**	**0.13 J**
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**0.003 J**	**1.5 J**	**0.77**	**4.5**	**0.67**	**0.21 J**
2,2,4-Trimethylpentane	NE	**0.007 J**	**0.1 J**	0.06 U	0.12 U	0.058 U	0.058 U
Vinyl acetate	NE	0.011 U	0.057 U	0.06 U	0.12 U	0.058 U	0.058 U
Total VOCs	NE	**0.051**	**25.506**	**3.518**	**49.266**	**7.782**	**1.284**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		G7 (16.5-17)	G7 (26.25-27.25)	H5 (12.5-13)	H6 (15.5-16.5)	H6 (20-21)	H7 (16-16.5)
Sample Date		4/22/2010	4/22/2010	4/19/2010	4/21/2010	4/21/2010	4/22/2010
Analyte	Unrestricted SCO						
Non-carcinogenic PAHs (mg/kg)							
Acenaphthene	20	**3.5**	**20**	**240**	**84**	**2.7**	**24**
Acenaphthylene	100	**17 J**	**70**	**28 J**	**4**	**30**	**15 J**
Anthracene	100	**96**	**160**	**110**	**45**	**36**	**38**
Benzo[g,h,i]perylene	100	**2.8 J**	**5.4**	**1.6 J**	**0.72**	**0.5**	**0.7 J**
Fluoranthene	100	**75**	**150**	**79**	**35**	**28**	**30**
Fluorene	30	**47**	**100**	**120**	**48**	**34**	**44**
2-Methylnaphthalene	NE	**7.3 J**	**86**	**10 J**	**15 J**	**13 J**	**4**
Naphthalene	12	**0.26 J**	**3.2 J**	**5.8 J**	**13 J**	**1.4**	**0.39 J**
Phenanthrene	100	**390**	**490**	**360**	**160**	**130**	**140**
Pyrene	100	**130**	**230**	**150**	**56**	**45**	**50**
Total Non-carcinogenic PAHs	NE	**768.86**	**1314.6**	**1104.4**	**460.72**	**320.6**	**346.09**
Carcinogenic PAHs (mg/kg)							
Benz[a]anthracene	1	**44**	**89**	**53**	**21**	**16 J**	**19**
Benzo[a]pyrene	1	**21 J**	**49**	**22 J**	**10 J**	**8.3 J**	**9.6 J**
Benzo[b]fluoranthene	1	**8.6 J**	**24**	**13 J**	**6**	**4.9**	**4 J**
Benzo[k]fluoranthene	0.8	**12 J**	**28**	**11 J**	**2.4 J**	**2.9 J**	**5.7 J**
Chrysene	1	**49**	**93**	**52**	**23**	**18 J**	**19**
Dibenz[a,h]anthracene	0.33	**1.9 J**	**5.4**	**1 J**	**0.4**	**0.42**	**0.53 J**
Indeno[1,2,3-cd]pyrene	0.5	**2.5 J**	**6.1**	**1.5 J**	**0.82**	**0.63**	**0.65 J**
Total Carcinogenic PAHs	NE	**139**	**294.5**	**153.5**	**63.62**	**51.15**	**58.48**
Total PAHs (mg/kg)							
Total PAHs	NE	**907.86**	**1609.1**	**1257.9**	**524.34**	**371.75**	**404.57**
Other SVOCs (mg/kg)							
Bis(2-ethylhexyl)phthalate	NE	**0.19 J**	3.8 U	0.4 UJ	**0.26 J**	**0.43**	0.38 UJ
Dibenzofuran	7	**3.6**	**17**	**6.2 J**	**3.6**	**2.8**	**3.9**
Diethyl phthalate	NE	0.37 U	3.8 U	0.4 U	0.39 U	0.38 U	0.38 U
Phenol	0.33	0.37 U	3.8 U	0.4 U	0.39 U	0.38 U	0.38 U
Total SVOCs	NE	**911.65**	**1626.1**	**1264.1**	**528.2**	**374.98**	**408.47**
Other							
Percent Moisture *(%)*	NE	**11.8**	**12.9**	**17**	**15.7**	**13.9**	**13.9**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**8400**	**15000**	**9100**	**7100**	**4100**	**5200**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		H7 (22-23)	H8 (20.5-22)	H9 (26.5-27)	H9 (32-32.5)	I7 (15-16)	I7 (21.5-22)	I8 (20.5-21.5)
Sample Date		4/22/2010	4/23/2010	4/26/2010	4/26/2010	4/22/2010	4/22/2010	4/23/2010
Analyte	Unrestricted SCO							
BTEX (mg/kg)								
Benzene	0.06	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Toluene	0.7	**0.055 J**	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	**0.002 J**
Ethylbenzene	1	0.12 U	0.059 U	**0.013 J**	0.061 U	0.12 U	0.061 U	0.012 U
m,p-Xylene	0.26	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
o-Xylene	0.26	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Total BTEX	NE	**0.055**	ND	**0.013**	ND	ND	ND	**0.002**
Other VOCs (mg/kg)								
Acetaldehyde	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Acetone	0.05	0.12 U	**0.027 J**	**0.025 J**	**0.031 J**	**0.066 J**	**0.022 J**	**0.008 J**
2-Butanone (Methyl ethyl ketone)	0.12	0.12 U	0.059 U	0.059 U	0.061 U	**0.039 J**	0.061 U	**0.018**
Carbon disulfide	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Chlorobenzene	1.1	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
1,2-Dichlorobenzene	1.1	**0.81 J**	0.059 U	**0.078**	**0.021 J**	**0.15**	0.061 U	**0.005 J**
1,3-Dichlorobenzene	2.4	**0.052 J**	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
1,4-Dichlorobenzene	1.8	**0.51 J**	0.059 U	**0.063**	**0.035 J**	**0.071 J**	0.061 U	**0.005 J**
1,2-Dichloroethane	0.02	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
n-Heptane	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Hexachlorobutadiene	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
n-Hexane	NE	0.12 U	0.059 U	**0.034 J**	**0.035 J**	0.12 U	0.061 U	**0.007 J**
2-Hexanone	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Isopropyl benzene	NE	**0.11 J**	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Methyl tert-butyl ether	0.93	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
4-Methyl-2-pentanone	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Methylene chloride	0.05	0.12 U	0.035 U	0.059 U	0.061 U	**0.032 J**	**0.038 J**	0.012 U
Naphthalene	12	**36**	**0.15**	**1.1**	**0.35**	**1.9**	**0.67**	**0.032**
2-Propanol (Isopropyl Alcohol)	NE	5.9 U	3 U	3 U	3.1 U	5.9 U	3.1 U	0.6 U
n-Propylbenzene	3.9	**0.34 J**	0.059 U	**0.22**	**0.052 J**	**0.037 J**	0.061 U	**0.004 J**
Styrene	NE	**0.041 J**	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Tetrachloroethene	1.3	**0.2 J**	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
1,1,1-Trichloroethane	0.68	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
1,2,4-Trimethylbenzene	3.6	**2.6 J**	0.059 U	**0.75**	**0.11 J**	**0.35**	**0.025 J**	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**2.3 J**	0.059 U	**0.88**	**0.17 J**	**0.44**	**0.016 J**	**0.026**
2,2,4-Trimethylpentane	NE	0.12 U	**0.043 J**	**0.058 J**	**0.5 J**	0.12 U	0.061 U	**0.011 J**
Vinyl acetate	NE	0.12 U	0.059 U	0.059 U	0.061 U	0.12 U	0.061 U	0.012 U
Total VOCs	NE	**43.018**	**0.22**	**3.221**	**1.304**	**3.085**	**0.771**	**0.118**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		H7 (22-23)	H8 (20.5-22)	H9 (26.5-27)	H9 (32-32.5)	I7 (15-16)	I7 (21.5-22)	I8 (20.5-21.5)
Sample Date		4/22/2010	4/23/2010	4/26/2010	4/26/2010	4/22/2010	4/22/2010	4/23/2010
Analyte	Unrestricted SCO							
Non-carcinogenic PAHs (mg/kg)								
Acenaphthene	20	**50**	**3.2 J**	**23 J**	**12 J**	**25**	**0.64 J**	**1 J**
Acenaphthylene	100	**260**	**6.7 J**	**85**	**32**	**4.1 J**	**1.4 J**	**2.4**
Anthracene	100	**230**	**18**	**89**	**61**	**14**	**3.7**	**5**
Benzo[g,h,i]perylene	100	**6 J**	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Fluoranthene	100	**180**	**15**	**69**	**49**	**11**	**3**	**4.4**
Fluorene	30	**320**	**17**	**87**	**50**	**14**	**3.1**	**3.7**
2-Methylnaphthalene	NE	**780**	**6.4 J**	**220**	**49**	7.8 U	**0.88 J**	**3.6**
Naphthalene	12	**53 J**	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Phenanthrene	100	**740**	**72**	**350**	**230**	**60**	**15**	**19**
Pyrene	100	**280**	**25**	**120**	**80**	**19**	**5.2**	**7.5**
Total Non-carcinogenic PAHs	NE	**2899**	**163.3**	**1043**	**563**	**147.1**	**32.92**	**46.6**
Carcinogenic PAHs (mg/kg)								
Benz[a]anthracene	1	**120**	**8.6**	**39**	**27**	**6.4 J**	**1.6**	**2.5**
Benzo[a]pyrene	1	**52 J**	**4.3 J**	**20 J**	**14 J**	**3 J**	**0.8 J**	**1.2 J**
Benzo[b]fluoranthene	1	**35 J**	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Benzo[k]fluoranthene	0.8	**27 J**	**2.5 J**	**14 J**	**9 J**	**1.7 J**	**0.4 J**	**0.66 J**
Chrysene	1	**110**	**9.7**	**44**	**30**	**7.8**	**1.9**	**3**
Dibenz[a,h]anthracene	0.33	**5.3 J**	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Indeno[1,2,3-cd]pyrene	0.5	**6.2 J**	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Total Carcinogenic PAHs	NE	**355.5**	**25.1**	**117**	**80**	**18.9**	**4.7**	**7.36**
Total PAHs (mg/kg)								
Total PAHs	NE	**3254.5**	**188.4**	**1160**	**643**	**166**	**37.62**	**53.96**
Other SVOCs (mg/kg)								
Bis(2-ethylhexyl)phthalate	NE	3.9 U	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Dibenzofuran	7	**34**	**2 J**	**10 J**	**9.2 J**	**2 J**	1.6 U	**0.5 J**
Diethyl phthalate	NE	3.9 U	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Phenol	0.33	3.9 U	7.8 U	39 U	20 U	7.8 U	1.6 U	2 U
Total SVOCs	NE	**3288.5**	**190.4**	**1170**	**652.2**	**168**	**37.62**	**54.46**
Other								
Percent Moisture *(%)*	NE	**15.8**	**15.9**	**15.7**	**18.5**	**15.6**	**18.3**	**17.1**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**20000**	**1600**	**8300**	**5800**	**1600**	**250**	**810**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		J7 (6-7)	J8 (21.75-22.5)	J9 (5-6)	SBDUP-03	J9 (7.5-8)	J9 (27.5-28)	WCSB-74 (15-16)
Sample Date		4/23/2010	4/23/2010	4/26/2010	4/26/2010	4/26/2010	4/26/2010	4/21/2008
Analyte	Unrestricted SCO							
BTEX (mg/kg)								
Benzene	0.06	**0.06**	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Toluene	0.7	**0.013 J**	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Ethylbenzene	1	**0.42**	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
m,p-Xylene	0.26	**0.074**	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
o-Xylene	0.26	**0.025 J**	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Total BTEX	NE	**0.592**	ND	ND	ND	ND	ND	ND
Other VOCs (mg/kg)								
Acetaldehyde	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 UJ
Acetone	0.05	**0.34**	0.032 U	**0.018 J**	0.011 UJ	**0.016**	0.059 U	**0.016 J**
2-Butanone (Methyl ethyl ketone)	0.12	**0.088**	0.061 U	**0.004 J**	**0.004 J**	**0.004 J**	0.059 U	0.012 UJ
Carbon disulfide	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	**0.001 J**	0.059 U	0.012 U
Chlorobenzene	1.1	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
1,2-Dichlorobenzene	1.1	0.055 U	**0.12 J**	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
1,3-Dichlorobenzene	2.4	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
1,4-Dichlorobenzene	1.8	0.055 U	**0.064 J**	0.011 UJ	0.012 UJ	0.012 U	0.059 U	**0.003 J**
1,2-Dichloroethane	0.02	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
n-Heptane	NE	0.055 U	0.061 U	**0.01 J**	0.012 UJ	0.012 U	0.059 U	0.012 U
Hexachlorobutadiene	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
n-Hexane	NE	0.055 U	0.061 U	**0.007 J**	**0.002 J**	**0.006 J**	0.059 U	0.012 U
2-Hexanone	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Isopropyl benzene	NE	**0.16**	**0.038 J**	**0.019 J**	**0.007 J**	0.012 U	0.059 U	0.012 U
Methyl tert-butyl ether	0.93	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
4-Methyl-2-pentanone	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Methylene chloride	0.05	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Naphthalene	12	**51**	**8.2**	0.011 UJ	0.012 UJ	0.012 U	**2.6**	**0.021**
2-Propanol (Isopropyl Alcohol)	NE	2.8 U	3 U	0.57 UJ	0.58 UJ	0.58 U	2.9 U	R
n-Propylbenzene	3.9	**0.13**	**0.12 J**	**0.032 J**	**0.016 J**	0.012 U	**0.043 J**	0.012 U
Styrene	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Tetrachloroethene	1.3	0.055 U	**0.022 J**	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
1,1,1-Trichloroethane	0.68	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
1,2,4-Trimethylbenzene	3.6	**1.4 J**	**0.53 J**	0.011 UJ	0.012 UJ	0.012 U	**0.21**	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**1.2**	**1.2 J**	0.011 UJ	0.012 UJ	0.012 U	**0.16**	0.012 U
2,2,4-Trimethylpentane	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Vinyl acetate	NE	0.055 U	0.061 U	0.011 UJ	0.012 UJ	0.012 U	0.059 U	0.012 U
Total VOCs	NE	**54.91**	**10.294**	**0.11**	**0.029**	**0.027**	**3.013**	**0.04**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		J7 (6-7)	J8 (21.75-22.5)	J9 (5-6)	SBDUP-03	J9 (7.5-8)	J9 (27.5-28)	WCSB-74 (15-16)
Sample Date		4/23/2010	4/23/2010	4/26/2010	4/26/2010	4/26/2010	4/26/2010	4/21/2008
Analyte	Unrestricted SCO							
Non-carcinogenic PAHs (mg/kg)								
Acenaphthene	20	**0.67**	**0.28 J**	**0.18 J**	**0.41**	7.7 U	**0.11 J**	**2.7**
Acenaphthylene	100	**0.1 J**	**0.7**	0.38 U	0.39 U	**4.7 J**	**0.35 J**	**5.2**
Anthracene	100	**0.42**	**0.97**	**0.26 J**	**0.37 J**	**8.2**	**0.45**	**25**
Benzo[g,h,i]perylene	100	0.37 U	0.4 U	0.38 U	0.39 U	**2 J**	0.39 U	**2.2 J**
Fluoranthene	100	**0.4**	**0.69**	**0.15 J**	**0.19 J**	**26**	**0.61**	**34**
Fluorene	30	**0.31 J**	**1.1**	**0.41**	**0.72**	7.7 U	**0.52**	**13**
2-Methylnaphthalene	NE	**0.54**	**1.3**	0.38 U	0.39 U	7.7 U	**0.25 J**	0.39 U
Naphthalene	12	**0.16 J**	0.4 U	**0.2 J**	0.39 U	7.7 U	0.39 U	0.39 U
Phenanthrene	100	**1.1**	**3.1**	**0.73**	**1.1**	**21**	**3**	**97**
Pyrene	100	**0.72**	**1.1**	**0.56**	**0.71**	**43**	**1.1**	**46**
Total Non-carcinogenic PAHs	NE	**4.42**	**9.24**	**2.49**	**3.5**	**104.9**	**6.39**	**225.1**
Carcinogenic PAHs (mg/kg)								
Benz[a]anthracene	1	**0.38**	**0.45**	**0.11 J**	**0.16 J**	**14**	**0.31 J**	**22**
Benzo[a]pyrene	1	**0.19 J**	**0.23 J**	0.38 U	**0.082 J**	**8.2**	**0.1 J**	**12**
Benzo[b]fluoranthene	1	0.37 U	**0.11 J**	0.38 U	0.39 U	**2.7 J**	0.39 U	**8.3**
Benzo[k]fluoranthene	0.8	**0.097 J**	**0.098 J**	0.38 U	0.39 UJ	**5.3 J**	**0.098 J**	**4.3 J**
Chrysene	1	**0.4**	**0.44**	**0.13 J**	**0.2 J**	**17**	**0.4**	**18**
Dibenz[a,h]anthracene	0.33	0.37 U	0.4 U	0.38 U	0.39 U	7.7 U	0.39 U	**0.59 J**
Indeno[1,2,3-cd]pyrene	0.5	0.37 U	0.4 U	0.38 U	0.39 U	7.7 U	0.39 U	**2 J**
Total Carcinogenic PAHs	NE	**1.067**	**1.328**	**0.24**	**0.442**	**47.2**	**0.908**	**67.19**
Total PAHs (mg/kg)								
Total PAHs	NE	**5.487**	**10.568**	**2.73**	**3.942**	**152.1**	**7.298**	**292.29**
Other SVOCs (mg/kg)								
Bis(2-ethylhexyl)phthalate	NE	0.37 U	0.4 U	**0.081 J**	0.39 U	7.7 U	**0.1 J**	0.39 UJ
Dibenzofuran	7	0.37 U	**0.1 J**	**0.11 J**	**0.16 J**	7.7 U	0.39 U	**1.3**
Diethyl phthalate	NE	0.37 U	0.4 U	0.38 U	0.39 U	7.7 U	0.39 U	**0.27 J**
Phenol	0.33	0.37 U	0.4 U	0.38 U	0.39 U	7.7 U	0.39 U	0.39 U
Total SVOCs	NE	**5.487**	**10.668**	**2.921**	**4.102**	**152.1**	**7.398**	**293.86**
Other								
Percent Moisture *(%)*	NE	**9.7**	**17.4**	**12.6**	**14.3**	**14.5**	**14.6**	**14.8**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**54**	**120**	**630**	**1900 J**	**1400**	200 U	NA

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-74 (30-32)**	**WCSB-75 (22-23.5)**	**WCSB-78 (3-5)**	**WCSB-78 (10-11.5)**
Sample Date		4/21/2008	4/22/2008	4/22/2008	4/22/2008
Analyte	Unrestricted SCO				
BTEX (mg/kg)					
Benzene	0.06	0.012 U	0.011 U	0.011 U	0.012 U
Toluene	0.7	0.012 U	0.011 U	0.011 U	0.012 U
Ethylbenzene	1	0.012 U	0.011 U	0.011 U	0.012 U
m,p-Xylene	0.26	0.012 U	0.011 U	0.011 U	0.012 U
o-Xylene	0.26	0.012 U	0.011 U	0.011 U	0.012 U
Total BTEX	NE	ND	ND	ND	ND
Other VOCs (mg/kg)					
Acetaldehyde	NE	0.012 UJ	0.011 UJ	0.011 UJ	0.012 UJ
Acetone	0.05	0.012 UJ	0.011 UJ	0.011 UJ	0.012 UJ
2-Butanone (Methyl ethyl ketone)	0.12	0.012 UJ	0.011 UJ	0.011 UJ	0.012 UJ
Carbon disulfide	NE	0.012 U	0.011 U	0.011 U	0.012 U
Chlorobenzene	1.1	0.012 U	0.011 U	0.011 U	0.012 U
1,2-Dichlorobenzene	1.1	0.012 U	0.011 U	0.011 U	0.012 U
1,3-Dichlorobenzene	2.4	0.012 U	0.011 U	0.011 U	0.012 U
1,4-Dichlorobenzene	1.8	0.012 U	0.011 U	0.011 U	0.012 U
1,2-Dichloroethane	0.02	0.012 U	0.011 U	0.011 U	0.012 U
n-Heptane	NE	0.012 U	0.011 U	0.011 U	0.012 U
Hexachlorobutadiene	NE	0.012 U	0.011 U	0.011 U	0.012 U
n-Hexane	NE	0.012 U	0.011 U	0.011 U	0.012 U
2-Hexanone	NE	0.012 U	0.011 U	0.011 U	0.012 U
Isopropyl benzene	NE	0.012 U	0.011 U	0.011 U	0.012 U
Methyl tert-butyl ether	0.93	0.012 U	0.011 U	0.011 U	0.012 U
4-Methyl-2-pentanone	NE	0.012 U	0.011 U	0.011 U	0.012 U
Methylene chloride	0.05	0.012 U	0.011 U	0.011 U	0.007 U
Naphthalene	12	0.012 U	0.011 U	0.011 U	0.012 U
2-Propanol (Isopropyl Alcohol)	NE	R	R	R	R
n-Propylbenzene	3.9	0.012 U	0.011 U	0.011 U	0.012 U
Styrene	NE	0.012 U	0.011 U	0.011 U	0.012 U
Tetrachloroethene	1.3	0.012 U	0.011 U	0.011 U	0.012 U
1,1,1-Trichloroethane	0.68	0.012 U	0.011 U	0.011 U	0.012 U
1,2,4-Trimethylbenzene	3.6	0.012 U	0.011 U	0.011 U	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	0.012 U	0.011 U	0.011 U	0.012 U
2,2,4-Trimethylpentane	NE	0.012 U	0.011 U	0.011 U	0.012 U
Vinyl acetate	NE	0.012 U	0.011 U	0.011 U	0.012 U
Total VOCs	NE	ND	ND	ND	ND

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-74 (30-32)**	**WCSB-75 (22-23.5)**	**WCSB-78 (3-5)**	**WCSB-78 (10-11.5)**
Sample Date		4/21/2008	4/22/2008	4/22/2008	4/22/2008
Analyte	Unrestricted SCO				
Non-carcinogenic PAHs (mg/kg)					
Acenaphthene	20	0.4 U	0.37 U	0.37 U	0.39 U
Acenaphthylene	100	0.4 U	0.37 U	0.37 U	0.39 U
Anthracene	100	0.4 U	0.37 U	0.37 U	0.39 U
Benzo[g,h,i]perylene	100	0.4 U	0.37 U	0.37 U	0.39 U
Fluoranthene	100	0.4 U	0.37 U	0.37 U	0.39 U
Fluorene	30	0.4 U	0.37 U	0.37 U	0.39 U
2-Methylnaphthalene	NE	0.4 U	0.37 U	0.37 U	0.39 U
Naphthalene	12	0.4 U	0.37 U	0.37 U	0.39 U
Phenanthrene	100	0.4 U	0.37 U	0.37 U	0.39 U
Pyrene	100	0.4 U	0.37 U	0.37 U	0.39 U
Total Non-carcinogenic PAHs	NE	ND	ND	ND	ND
Carcinogenic PAHs (mg/kg)					
Benz[a]anthracene	1	0.4 U	0.37 U	0.37 U	0.39 U
Benzo[a]pyrene	1	0.4 U	0.37 U	0.37 U	0.39 U
Benzo[b]fluoranthene	1	0.4 U	0.37 U	0.37 U	0.39 U
Benzo[k]fluoranthene	0.8	0.4 U	0.37 U	0.37 U	0.39 U
Chrysene	1	0.4 U	0.37 U	0.37 U	0.39 U
Dibenz[a,h]anthracene	0.33	0.4 U	0.37 U	0.37 U	0.39 U
Indeno[1,2,3-cd]pyrene	0.5	0.4 U	0.37 U	0.37 U	0.39 U
Total Carcinogenic PAHs	NE	ND	ND	ND	ND
Total PAHs (mg/kg)					
Total PAHs	NE	ND	ND	ND	ND
Other SVOCs (mg/kg)					
Bis(2-ethylhexyl)phthalate	NE	0.4 U	0.37 U	0.37 U	0.39 U
Dibenzofuran	7	0.4 U	0.37 U	0.37 U	0.39 U
Diethyl phthalate	NE	0.4 U	0.37 U	0.37 U	0.39 U
Phenol	0.33	0.4 U	0.37 U	0.37 U	0.39 U
Total SVOCs	NE	ND	ND	ND	ND
Other					
Percent Moisture *(%)*	NE	**16.9**	**11.5**	**11.4**	**16.1**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	NA	NA	NA	NA

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-78 (15-16)**	**WCSB-79 (6-8)**	**WCSB-79 (15-17)**	**WCSB-99 (13-15)**	**WCSB-99 (17.5-19.5)**
Sample Date		4/22/2008	4/23/2008	4/23/2008	6/19/2009	6/19/2009
Analyte	Unrestricted SCO					
BTEX (mg/kg)						
Benzene	0.06	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Toluene	0.7	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Ethylbenzene	1	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
m,p-Xylene	0.26	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
o-Xylene	0.26	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Total BTEX	NE	ND	ND	ND	ND	ND
Other VOCs (mg/kg)						
Acetaldehyde	NE	0.013 UJ	0.012 U	0.012 UJ	0.058 U	0.059 UJ
Acetone	0.05	0.013 UJ	0.012 UJ	0.012 UJ	0.058 U	0.065 U
2-Butanone (Methyl ethyl ketone)	0.12	0.013 UJ	0.012 UJ	0.012 UJ	0.058 U	0.059 U
Carbon disulfide	NE	0.013 U	0.012 U	0.012 U	**0.009 J**	0.059 U
Chlorobenzene	1.1	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
1,2-Dichlorobenzene	1.1	0.013 U	0.012 U	0.012 U	0.058 UJ	**0.13 J**
1,3-Dichlorobenzene	2.4	0.013 U	0.012 UJ	0.012 U	0.058 UJ	0.059 UJ
1,4-Dichlorobenzene	1.8	0.013 U	0.012 U	0.012 U	0.058 UJ	**0.16 J**
1,2-Dichloroethane	0.02	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
n-Heptane	NE	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Hexachlorobutadiene	NE	0.013 U	0.012 U	0.012 U	0.058 UJ	0.059 UJ
n-Hexane	NE	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
2-Hexanone	NE	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Isopropyl benzene	NE	0.013 U	0.012 U	0.012 U	**0.19 J**	**0.013 J**
Methyl tert-butyl ether	0.93	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
4-Methyl-2-pentanone	NE	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Methylene chloride	0.05	0.013 U	0.012 U	0.012 U	0.058 U	0.082 U
Naphthalene	12	0.013 U	0.012 U	0.012 U	**30**	**4.8**
2-Propanol (Isopropyl Alcohol)	NE	R	R	R	R	R
n-Propylbenzene	3.9	0.013 U	0.012 U	0.012 U	**0.055 J**	**0.016 J**
Styrene	NE	0.013 U	0.012 U	0.012 U	0.058 U	**0.015 J**
Tetrachloroethene	1.3	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
1,1,1-Trichloroethane	0.68	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
1,2,4-Trimethylbenzene	3.6	0.013 U	0.012 U	0.012 U	**1.5**	**0.27 J**
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	0.013 U	0.012 U	0.012 U	**2 J**	**0.33 J**
2,2,4-Trimethylpentane	NE	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Vinyl acetate	NE	0.013 U	0.012 U	0.012 U	0.058 U	0.059 U
Total VOCs	NE	ND	ND	ND	**33.754**	**5.734**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-78 (15-16)**	**WCSB-79 (6-8)**	**WCSB-79 (15-17)**	**WCSB-99 (13-15)**	**WCSB-99 (17.5-19.5)**
Sample Date		4/22/2008	4/23/2008	4/23/2008	6/19/2009	6/19/2009
Analyte	Unrestricted SCO					
Non-carcinogenic PAHs (mg/kg)						
Acenaphthene	20	0.41 U	0.4 U	0.39 U	**330**	**180**
Acenaphthylene	100	0.41 U	0.4 U	0.39 U	**29**	**42**
Anthracene	100	0.41 U	0.4 U	0.39 U	**210**	**250**
Benzo[g,h,i]perylene	100	0.41 U	0.4 U	0.39 U	**22 J**	**28 J**
Fluoranthene	100	0.41 U	0.4 U	0.39 U	**260**	**310**
Fluorene	30	0.41 U	0.4 U	0.39 U	**220**	**190**
2-Methylnaphthalene	NE	0.41 U	0.4 U	0.39 U	**140**	3.9 U
Naphthalene	12	0.41 U	0.4 U	0.39 U	**71 J**	**3.4 J**
Phenanthrene	100	0.41 U	0.4 U	0.39 U	**820**	**990**
Pyrene	100	0.41 U	0.4 U	0.39 U	**340**	**420**
Total Non-carcinogenic PAHs	NE	ND	ND	ND	**2442**	**2413.4**
Carcinogenic PAHs (mg/kg)						
Benz[a]anthracene	1	0.41 U	0.4 U	0.39 U	**150**	**190**
Benzo[a]pyrene	1	0.41 U	0.4 U	0.39 U	**80**	**100**
Benzo[b]fluoranthene	1	0.41 U	0.4 U	0.39 U	**38 J**	**37 J**
Benzo[k]fluoranthene	0.8	0.41 U	0.4 U	0.39 U	**55 J**	**80**
Chrysene	1	0.41 U	0.4 U	0.39 U	**140**	**180**
Dibenz[a,h]anthracene	0.33	0.41 U	0.4 U	0.39 U	**4.8 J**	**8.4 J**
Indeno[1,2,3-cd]pyrene	0.5	0.41 U	0.4 U	0.39 U	**21 J**	**25 J**
Total Carcinogenic PAHs	NE	ND	ND	ND	**488.8**	**620.4**
Total PAHs (mg/kg)						
Total PAHs	NE	ND	ND	ND	**2930.8**	**3033.8**
Other SVOCs (mg/kg)						
Bis(2-ethylhexyl)phthalate	NE	0.41 U	0.4 U	0.39 U	3.8 UJ	3.9 UJ
Dibenzofuran	7	0.41 U	0.4 U	0.39 U	**19**	**20**
Diethyl phthalate	NE	0.41 U	**0.24 J**	**0.2 J**	3.8 U	3.9 U
Phenol	0.33	0.41 U	0.4 U	0.39 U	3.8 U	3.9 U
Total SVOCs	NE	ND	**0.24**	**0.2**	**2949.8**	**3053.8**
Other						
Percent Moisture *(%)*	NE	**20.2**	**17.5**	**16**	NA	NA
Total Petroleum Hydrocarbons *(mg/kg)*	NE	NA	NA	NA	**12000**	**19000**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-99 (25-27)**	**WCSB-100 (8-10)**	**WCSB-100 (16-18)**	**WCSB-101 (5-6)**	**WCSB-101 (7-8)**
Sample Date		6/19/2009	6/24/2009	6/24/2009	6/18/2009	6/18/2009
Analyte	Unrestricted SCO					
BTEX (mg/kg)						
Benzene	0.06	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Toluene	0.7	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Ethylbenzene	1	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
m,p-Xylene	0.26	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
o-Xylene	0.26	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Total BTEX	NE	ND	ND	ND	ND	ND
Other VOCs (mg/kg)						
Acetaldehyde	NE	0.012 U	0.011 UJ	0.012 UJ	0.012 U	0.012 U
Acetone	0.05	0.012 U	0.014 U	0.012 U	0.012 U	0.012 U
2-Butanone (Methyl ethyl ketone)	0.12	0.012 U	**0.004 J**	0.012 U	**0.001 J**	0.012 U
Carbon disulfide	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Chlorobenzene	1.1	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
1,2-Dichlorobenzene	1.1	0.012 U	0.011 UJ	0.012 UJ	0.012 U	0.012 U
1,3-Dichlorobenzene	2.4	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
1,4-Dichlorobenzene	1.8	0.012 U	0.011 UJ	0.012 UJ	0.012 U	0.012 U
1,2-Dichloroethane	0.02	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
n-Heptane	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Hexachlorobutadiene	NE	0.012 U	0.011 UJ	0.012 UJ	0.012 U	0.012 U
n-Hexane	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
2-Hexanone	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Isopropyl benzene	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Methyl tert-butyl ether	0.93	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
4-Methyl-2-pentanone	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Methylene chloride	0.05	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Naphthalene	12	**0.004 J**	**0.021 J**	0.012 UJ	0.012 U	0.012 U
2-Propanol (Isopropyl Alcohol)	NE	R	R	R	R	R
n-Propylbenzene	3.9	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Styrene	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Tetrachloroethene	1.3	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
1,1,1-Trichloroethane	0.68	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	3.6	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
2,2,4-Trimethylpentane	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Vinyl acetate	NE	0.012 U	0.011 U	0.012 U	0.012 U	0.012 U
Total VOCs	NE	**0.004**	**0.025**	ND	**0.001**	ND

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-99 (25-27)**	**WCSB-100 (8-10)**	**WCSB-100 (16-18)**	**WCSB-101 (5-6)**	**WCSB-101 (7-8)**
Sample Date		6/19/2009	6/24/2009	6/24/2009	6/18/2009	6/18/2009
Analyte	Unrestricted SCO					
Non-carcinogenic PAHs (mg/kg)						
Acenaphthene	20	0.39 U	**0.76**	0.39 U	**0.3 J**	0.4 U
Acenaphthylene	100	0.39 U	**3.8**	0.39 U	**0.58**	0.4 U
Anthracene	100	0.39 U	**22**	**0.13 J**	**3.9**	0.4 U
Benzo[g,h,i]perylene	100	0.39 U	**0.98 J**	0.39 U	**0.42**	0.4 U
Fluoranthene	100	**0.11 J**	**29**	**0.18 J**	**5.8**	0.4 U
Fluorene	30	0.39 U	**1.2**	0.39 U	**1.4**	0.4 U
2-Methylnaphthalene	NE	0.39 U	**0.87**	0.39 U	0.39 U	0.4 U
Naphthalene	12	0.39 U	**0.4**	0.39 U	0.39 U	0.4 U
Phenanthrene	100	**0.24 J**	**84**	**0.51**	**11**	0.4 U
Pyrene	100	**0.15 J**	**39**	**0.24 J**	**7.9**	0.4 U
Total Non-carcinogenic PAHs	NE	**0.5**	**182.01**	**1.06**	**31.3**	ND
Carcinogenic PAHs (mg/kg)						
Benz[a]anthracene	1	0.39 U	**16 J**	**0.11 J**	**3.6**	0.4 U
Benzo[a]pyrene	1	0.39 U	**8.5 J**	0.39 U	**2**	0.4 U
Benzo[b]fluoranthene	1	0.39 U	**4.6 J**	0.39 U	**0.9 J**	0.4 U
Benzo[k]fluoranthene	0.8	0.39 U	**6.2 J**	0.39 U	**1.2 J**	0.4 U
Chrysene	1	0.39 U	**16 J**	**0.11 J**	**3.6**	0.4 U
Dibenz[a,h]anthracene	0.33	0.39 U	**0.17 J**	0.39 U	**0.31 J**	0.4 U
Indeno[1,2,3-cd]pyrene	0.5	0.39 U	**1.1 J**	0.39 U	**0.46**	0.4 U
Total Carcinogenic PAHs	NE	ND	**52.57**	**0.22**	**12.07**	ND
Total PAHs (mg/kg)						
Total PAHs	NE	**0.5**	**234.58**	**1.28**	**43.37**	ND
Other SVOCs (mg/kg)						
Bis(2-ethylhexyl)phthalate	NE	0.39 U	**0.4 J**	**0.33 J**	0.7 U	0.4 U
Dibenzofuran	7	0.39 U	**0.11 J**	0.39 U	**0.12 J**	0.4 U
Diethyl phthalate	NE	**0.24 J**	0.38 U	0.39 U	**0.41**	**0.22 J**
Phenol	0.33	**0.19 J**	**0.13 J**	**0.098 J**	**0.18 J**	**0.16 J**
Total SVOCs	NE	**0.93**	**235.22**	**1.708**	**44.08**	**0.49**
Other						
Percent Moisture *(%)*	NE	NA	**12.1**	**14.5**	NA	NA
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**23 J**	**2300**	**18 J**	**450 J**	**16 J**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-102 (13-15)**	**WCSB-102 (16-18)**	**WCSB-103 (4-6)**	**WCSB-103 (6.5-10)**
Sample Date		6/25/2009	6/25/2009	6/19/2009	6/19/2009
Analyte	Unrestricted SCO				
BTEX (mg/kg)					
Benzene	0.06	0.012 U	0.012 U	0.012 U	0.011 U
Toluene	0.7	0.012 U	0.012 U	0.012 U	0.011 U
Ethylbenzene	1	0.012 U	0.012 U	0.012 U	0.011 U
m,p-Xylene	0.26	0.012 U	0.012 U	0.012 U	0.011 U
o-Xylene	0.26	0.012 U	0.012 U	0.012 U	0.011 U
Total BTEX	NE	ND	ND	ND	ND
Other VOCs (mg/kg)					
Acetaldehyde	NE	0.012 UJ	0.012 UJ	0.012 U	0.011 U
Acetone	0.05	0.012 U	0.012 U	0.012 U	0.018 U
2-Butanone (Methyl ethyl ketone)	0.12	0.012 U	0.012 U	0.012 U	**0.003 J**
Carbon disulfide	NE	0.012 U	0.012 U	0.012 U	**0.004 J**
Chlorobenzene	1.1	0.012 U	0.012 U	0.012 U	0.011 U
1,2-Dichlorobenzene	1.1	0.012 UJ	0.012 UJ	0.012 U	0.011 U
1,3-Dichlorobenzene	2.4	0.012 U	0.012 U	0.012 U	0.011 U
1,4-Dichlorobenzene	1.8	0.012 UJ	0.012 UJ	0.012 U	0.011 U
1,2-Dichloroethane	0.02	0.012 U	0.012 U	0.012 U	0.011 U
n-Heptane	NE	0.012 U	0.012 U	0.012 U	0.011 U
Hexachlorobutadiene	NE	0.012 UJ	0.012 UJ	0.012 U	0.011 U
n-Hexane	NE	0.012 U	0.012 U	0.012 U	0.011 U
2-Hexanone	NE	0.012 U	0.012 U	0.012 U	0.011 U
Isopropyl benzene	NE	0.012 U	0.012 U	0.012 U	0.011 U
Methyl tert-butyl ether	0.93	0.012 U	0.012 U	0.012 U	0.011 U
4-Methyl-2-pentanone	NE	0.012 U	0.012 U	0.012 U	0.011 U
Methylene chloride	0.05	0.012 U	0.012 U	0.012 U	0.011 U
Naphthalene	12	**0.004 J**	**0.003 J**	0.012 U	0.011 U
2-Propanol (Isopropyl Alcohol)	NE	R	R	R	R
n-Propylbenzene	3.9	0.012 U	0.012 U	0.012 U	0.011 U
Styrene	NE	0.012 U	0.012 U	0.012 U	0.011 U
Tetrachloroethene	1.3	0.012 U	0.012 U	0.012 U	0.011 U
1,1,1-Trichloroethane	0.68	0.012 U	0.012 U	0.012 U	0.011 U
1,2,4-Trimethylbenzene	3.6	0.012 UJ	0.012 U	0.012 U	0.011 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	0.012 U	0.012 U	0.012 U	0.011 U
2,2,4-Trimethylpentane	NE	0.012 U	0.012 U	0.012 U	0.011 U
Vinyl acetate	NE	0.012 U	0.012 U	0.012 U	0.011 U
Total VOCs	NE	**0.004**	**0.003**	ND	**0.007**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-102 (13-15)**	**WCSB-102 (16-18)**	**WCSB-103 (4-6)**	**WCSB-103 (6.5-10)**
Sample Date		6/25/2009	6/25/2009	6/19/2009	6/19/2009
Analyte	Unrestricted SCO				
Non-carcinogenic PAHs (mg/kg)					
Acenaphthene	20	**0.15 J**	0.41 U	0.38 U	0.38 U
Acenaphthylene	100	**0.19 J**	0.41 U	**0.21 J**	0.38 U
Anthracene	100	**0.87**	0.41 U	0.38 U	**0.13 J**
Benzo[g,h,i]perylene	100	**0.13 J**	0.41 U	**0.11 J**	0.38 U
Fluoranthene	100	**1.3**	**0.093 J**	0.38 U	**0.092 J**
Fluorene	30	0.4 U	0.41 U	0.38 U	0.38 U
2-Methylnaphthalene	NE	0.4 U	0.41 U	**0.078 J**	0.38 U
Naphthalene	12	0.4 U	0.41 U	**0.1 J**	0.38 U
Phenanthrene	100	**3.8**	**0.25 J**	0.38 U	0.38 U
Pyrene	100	**1.9**	**0.14 J**	**0.16 J**	**0.26 J**
Total Non-carcinogenic PAHs	NE	**8.34**	**0.483**	**0.658**	**0.482**
Carcinogenic PAHs (mg/kg)					
Benz[a]anthracene	1	**0.72**	0.41 U	0.38 U	**0.079 J**
Benzo[a]pyrene	1	**0.42**	0.41 U	**0.21 J**	**0.15 J**
Benzo[b]fluoranthene	1	**0.16 J**	0.41 U	0.38 U	0.38 U
Benzo[k]fluoranthene	0.8	**0.28 J**	0.41 U	**0.12 J**	0.38 U
Chrysene	1	**0.65**	0.41 U	**0.11 J**	**0.12 J**
Dibenz[a,h]anthracene	0.33	0.4 U	0.41 U	0.38 U	0.38 U
Indeno[1,2,3-cd]pyrene	0.5	**0.093 J**	0.41 U	**0.1 J**	0.38 U
Total Carcinogenic PAHs	NE	**2.323**	ND	**0.54**	**0.349**
Total PAHs (mg/kg)					
Total PAHs	NE	**10.663**	**0.483**	**1.198**	**0.831**
Other SVOCs (mg/kg)					
Bis(2-ethylhexyl)phthalate	NE	0.4 U	0.41 U	0.38 U	0.38 U
Dibenzofuran	7	0.4 U	0.41 U	0.38 U	0.38 U
Diethyl phthalate	NE	0.4 U	0.41 U	**0.3 J**	**0.14 J**
Phenol	0.33	**0.13 J**	**0.15 J**	**0.18 J**	**0.2 J**
Total SVOCs	NE	**10.793**	**0.633**	**1.808**	**1.171**
Other					
Percent Moisture *(%)*	NE	**16.8**	**19**	NA	NA
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**21 J**	**61 J**	**160**	**36**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-104 (3.5-5)**	**WCSB-104 (5-7)**	**WCSB-104 (12-14)**	**WCSB-105 (8-10)**
Sample Date		6/24/2009	6/24/2009	6/24/2009	6/24/2009
Analyte	Unrestricted SCO				
BTEX (mg/kg)					
Benzene	0.06	**0.037 J**	0.11 U	0.012 U	0.11 U
Toluene	0.7	0.12 U	0.11 U	0.012 U	0.11 U
Ethylbenzene	1	**5.7**	**3.1**	0.012 U	**0.11**
m,p-Xylene	0.26	**3.2**	**0.082 J**	0.012 U	0.11 U
o-Xylene	0.26	**0.21**	**0.16**	0.012 U	**0.045 J**
Total BTEX	NE	**9.147**	**3.342**	ND	**0.155**
Other VOCs (mg/kg)					
Acetaldehyde	NE	0.12 U	0.11 U	0.012 UJ	0.11 U
Acetone	0.05	0.19 U	0.11 U	0.015 U	0.11 U
2-Butanone (Methyl ethyl ketone)	0.12	**0.036 J**	**0.012 J**	**0.006**	0.11 U
Carbon disulfide	NE	0.12 U	0.11 U	0.012 U	0.11 U
Chlorobenzene	1.1	0.12 U	0.11 U	0.012 U	0.11 U
1,2-Dichlorobenzene	1.1	0.12 U	0.11 U	0.012 UJ	0.11 U
1,3-Dichlorobenzene	2.4	0.12 U	0.11 U	0.012 U	0.11 U
1,4-Dichlorobenzene	1.8	0.12 U	0.11 U	0.012 UJ	0.11 U
1,2-Dichloroethane	0.02	0.12 U	0.11 U	0.012 U	0.11 U
n-Heptane	NE	0.12 U	0.11 U	0.012 U	0.11 U
Hexachlorobutadiene	NE	0.12 U	0.11 U	0.012 UJ	0.11 U
n-Hexane	NE	0.12 U	0.11 U	0.012 U	0.11 U
2-Hexanone	NE	0.12 U	0.11 U	0.012 U	0.11 U
Isopropyl benzene	NE	**1.1 J**	**0.65 J**	0.012 U	**0.041 J**
Methyl tert-butyl ether	0.93	0.12 U	0.11 U	0.012 U	0.11 U
4-Methyl-2-pentanone	NE	0.12 U	0.11 U	0.012 U	0.11 U
Methylene chloride	0.05	0.12 U	0.11 U	0.012 U	0.11 U
Naphthalene	12	**39 J**	**26**	**0.02 J**	**16**
2-Propanol (Isopropyl Alcohol)	NE	R	R	R	R
n-Propylbenzene	3.9	**0.98 J**	**0.55 J**	0.012 U	0.11 U
Styrene	NE	0.12 U	0.11 U	0.012 U	0.11 U
Tetrachloroethene	1.3	0.12 U	0.11 U	0.012 U	0.11 U
1,1,1-Trichloroethane	0.68	0.12 U	0.11 U	0.012 U	0.11 U
1,2,4-Trimethylbenzene	3.6	**9.3 J**	**5.6**	0.012 U	**0.96**
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	**2.3 J**	**2.1**	0.012 U	**0.92 J**
2,2,4-Trimethylpentane	NE	0.12 U	0.11 U	0.012 U	0.11 U
Vinyl acetate	NE	0.12 U	0.11 U	0.012 U	0.11 U
Total VOCs	NE	**61.863**	**38.254**	**0.026**	**18.076**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		WCSB-104 (3.5-5)	WCSB-104 (5-7)	WCSB-104 (12-14)	WCSB-105 (8-10)
Sample Date		6/24/2009	6/24/2009	6/24/2009	6/24/2009
Analyte	Unrestricted SCO				
Non-carcinogenic PAHs (mg/kg)					
Acenaphthene	20	**33**	**22**	0.38 U	**72**
Acenaphthylene	100	**1.2**	**0.85**	0.38 U	**5.3**
Anthracene	100	**11**	**8.4**	0.38 U	**35**
Benzo[g,h,i]perylene	100	**0.31 J**	**0.31 J**	0.38 U	**1.4 J**
Fluoranthene	100	**7.9 J**	**5.6**	**0.33 J**	**41**
Fluorene	30	**12**	**8.6**	0.38 U	**38**
2-Methylnaphthalene	NE	**58**	**31**	0.38 U	**7.1 J**
Naphthalene	12	**43**	**18**	0.38 U	**24**
Phenanthrene	100	**37**	**27**	**0.66**	**140**
Pyrene	100	**13**	**8.9**	**0.43**	**58**
Total Non-carcinogenic PAHs	NE	**216.41**	**130.66**	**1.42**	**421.8**
Carcinogenic PAHs (mg/kg)					
Benz[a]anthracene	1	**4.8 J**	**3.3**	**0.18 J**	**25**
Benzo[a]pyrene	1	**2.6**	**1.9**	0.38 U	**13 J**
Benzo[b]fluoranthene	1	**1.5 J**	**0.83**	0.38 U	**6 J**
Benzo[k]fluoranthene	0.8	**2.3 J**	**1.6**	0.38 U	**10 J**
Chrysene	1	**4.7**	**3.5**	**0.18 J**	**25**
Dibenz[a,h]anthracene	0.33	0.4 UJ	**0.23 J**	0.38 U	**1 J**
Indeno[1,2,3-cd]pyrene	0.5	**0.36 J**	**0.3 J**	0.38 U	**1.4 J**
Total Carcinogenic PAHs	NE	**16.26**	**11.66**	**0.36**	**81.4**
Total PAHs (mg/kg)					
Total PAHs	NE	**232.67**	**142.32**	**1.78**	**503.2**
Other SVOCs (mg/kg)					
Bis(2-ethylhexyl)phthalate	NE	**0.5 J**	**0.34 J**	0.38 UJ	0.45 UJ
Dibenzofuran	7	**1.1**	**0.85**	0.38 U	**3.9**
Diethyl phthalate	NE	0.4 U	0.38 U	0.38 U	0.38 U
Phenol	0.33	**0.14 J**	**0.13 J**	**0.16 J**	**0.098 J**
Total SVOCs	NE	**234.77**	**143.74**	**1.94**	**507.198**
Other					
Percent Moisture *(%)*	NE	**17.1**	**12.8**	NA	NA
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**1500**	**890**	**70**	**5000**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		**WCSB-105 (15-17)**	**WCSB-106 (5-7)**	**WCSB-106 (8-10)**	**WCSB-107 (13-15)**	**WCSB-107 (16-18)**
Sample Date		6/24/2009	6/24/2009	6/24/2009	6/25/2009	6/25/2009
Analyte	Unrestricted SCO					
BTEX (mg/kg)						
Benzene	0.06	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Toluene	0.7	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Ethylbenzene	1	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
m,p-Xylene	0.26	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
o-Xylene	0.26	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Total BTEX	NE	ND	ND	ND	ND	ND
Other VOCs (mg/kg)						
Acetaldehyde	NE	0.011 Uj	0.011 UJ	0.011 UJ	0.012 UJ	0.012 UJ
Acetone	0.05	0.034 U	0.033 U	0.023 U	0.012 U	0.012 U
2-Butanone (Methyl ethyl ketone)	0.12	0.011 U	**0.002 J**	0.011 U	0.012 U	0.012 U
Carbon disulfide	NE	0.011 U	**0.001 J**	0.011 U	0.012 U	0.012 U
Chlorobenzene	1.1	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
1,2-Dichlorobenzene	1.1	0.011 UJ	0.011 UJ	0.011 UJ	0.012 UJ	0.012 UJ
1,3-Dichlorobenzene	2.4	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
1,4-Dichlorobenzene	1.8	0.011 UJ	0.011 UJ	0.011 UJ	**0.004 J**	0.012 UJ
1,2-Dichloroethane	0.02	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
n-Heptane	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Hexachlorobutadiene	NE	0.011 UJ	0.011 UJ	0.011 UJ	0.012 UJ	0.012 UJ
n-Hexane	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
2-Hexanone	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Isopropyl benzene	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Methyl tert-butyl ether	0.93	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
4-Methyl-2-pentanone	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Methylene chloride	0.05	0.01 U	0.011 U	0.011 U	0.012 U	0.012 U
Naphthalene	12	**0.015 J**	**0.031 J**	0.011 UJ	**0.035 J**	**0.007 J**
2-Propanol (Isopropyl Alcohol)	NE	R	R	R	R	R
n-Propylbenzene	3.9	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Styrene	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Tetrachloroethene	1.3	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
1,1,1-Trichloroethane	0.68	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
1,2,4-Trimethylbenzene	3.6	0.011 U	0.011 U	0.011 UJ	0.012 U	0.012 U
1,3,5-Trimethylbenzene/P-ethyltoluene	8.4	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
2,2,4-Trimethylpentane	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Vinyl acetate	NE	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U
Total VOCs	NE	**0.015**	**0.034**	ND	**0.039**	**0.007**

Table A2 – OU-4 Cesspool and Pond IRM Outside of Excavation Soil Analytical Results

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Sample Name		WCSB-105 (15-17)	WCSB-106 (5-7)	WCSB-106 (8-10)	WCSB-107 (13-15)	WCSB-107 (16-18)
Sample Date		6/24/2009	6/24/2009	6/24/2009	6/25/2009	6/25/2009
Analyte	Unrestricted SCO					
Non-carcinogenic PAHs (mg/kg)						
Acenaphthene	20	**0.84**	**2**	0.37 U	**9.2 J**	0.41 U
Acenaphthylene	100	**0.92**	**0.31 J**	0.37 U	**10 J**	0.41 U
Anthracene	100	**2**	**2**	0.37 U	**37**	**0.086 J**
Benzo[g,h,i]perylene	100	**0.24 J**	**0.16 J**	0.37 U	**2.3**	0.41 U
Fluoranthene	100	**5**	**2.1**	0.37 U	**48**	**0.14 J**
Fluorene	30	**0.75**	**1.4**	0.37 U	**16 J**	0.41 U
2-Methylnaphthalene	NE	0.38 U	**0.35 J**	0.37 U	**0.25 J**	0.41 U
Naphthalene	12	0.38 U	**0.12 J**	0.37 U	**0.1 J**	0.41 U
Phenanthrene	100	**19**	**7.1**	0.37 U	**140**	**0.26 J**
Pyrene	100	**7.2**	**3.4**	0.37 U	**63**	**0.2 J**
Total Non-carcinogenic PAHs	NE	**35.95**	**18.94**	ND	**325.85**	**0.686**
Carcinogenic PAHs (mg/kg)						
Benz[a]anthracene	1	**2.7**	**1.5**	0.37 U	**27**	**0.092 J**
Benzo[a]pyrene	1	**1.2 J**	**0.74**	0.37 U	**16 J**	0.41 U
Benzo[b]fluoranthene	1	**0.59 J**	**0.24 J**	0.37 U	**6.8 J**	0.41 U
Benzo[k]fluoranthene	0.8	**1.5 J**	**0.61**	0.37 U	**9.8 J**	0.41 U
Chrysene	1	**2.9**	**1.7**	0.37 U	**29**	**0.095 J**
Dibenz[a,h]anthracene	0.33	**0.11 J**	**0.11 J**	0.37 U	**1.3**	0.41 U
Indeno[1,2,3-cd]pyrene	0.5	**0.2 J**	**0.16 J**	0.37 U	**2.1**	0.41 U
Total Carcinogenic PAHs	NE	**9.2**	**5.06**	ND	**92**	**0.187**
Total PAHs (mg/kg)						
Total PAHs	NE	**45.15**	**24**	ND	**417.85**	**0.873**
Other SVOCs (mg/kg)						
Bis(2-ethylhexyl)phthalate	NE	0.38 UJ	**0.36 J**	0.37 UJ	0.38 U	**0.35 J**
Dibenzofuran	7	0.38 U	**0.13 J**	0.37 U	**2**	0.41 U
Diethyl phthalate	NE	0.38 U	0.37 U	0.37 U	0.38 U	0.41 U
Phenol	0.33	**0.11 J**	**0.12 J**	**0.13 J**	**0.14 J**	**0.16 J**
Total SVOCs	NE	**45.26**	**24.61**	**0.13**	**419.99**	**1.383**
Other						
Percent Moisture *(%)*	NE	NA	**11.2**	NA	**14.2**	**18.9**
Total Petroleum Hydrocarbons *(mg/kg)*	NE	**640**	**370**	**85**	**2300**	**20 J**

Table 2
Soil Sample Analytical Results
Outside of Excavation Extent OU-4 Cesspool Area
Bay Shore/Brightwaters Former MGP Site

Notes:

mg/kg - milligrams/kilogram or parts per million (ppm)
BTEX - benzene, toluene, ethylbenzene, and xylenes
VOCs - volatile organic compounds
PAHs - polycyclic aromatic hydrocarbons
SVOCs - semivolatile organic compounds
Total BTEX, Total VOCs, Total PAHs, and Total SVOCs are calculated using detects only.
Benzo[b]fluoranthene, Benzo[g,h,i]perylene, Benzo[k]fluoranthene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, and Pyrene
Total PAH17 is calculated using the EPA16 list of analytes plus 2-Methylnaphthalene

6 NYCRR -New York State Register and Official Compilation of Codes, Rules and Regulations of the State of New York
Comparison of detected results are performed against one or more of the following NYCRR, Chapter IV, Part 375-6 Soil Cleanup Objectives (SCO)s: Unrestricted Use, Commercial

NE - not established
NA - not analyzed
ND - not detected; total concentrations are listed as ND because no analytes are detected in the group

Bolding indicates a detected concentration
Gray shading and bolding indicates that the detected result value exceeds the Unrestricted SCO
Yellow shading and bolding indicates that the detected result value exceeds the 500 ppm total PAH SCO, for non-residential sites per NYSDEC CP-51 / Soil Cleanup Guidance, Section V(H) and Unrestricted Use SCOs

Validation Qualifiers:

D - Results for dilution
J - estimated value
R - rejected
U - indicates not detected to the reporting limit
UJ - not detected at or above the reporting limit shown and the reporting limit is estimated

Table A3 – PDI Soil Analytical Results

Table 1. Bay Shore 22 Oak Street
PDI Soil Analysis Results
National Grid
Bay Shore, NY

				Location Name	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST	22 OAK ST
				Sample Name	PDI-1 (19-20)	PDI-2 (15-16)	PDI-3 (17-18)	PDI-4 (15-16)	PDI-5 (19-20)	PDI-6 (19-20)	Dup-01	PDI-8 (19-20)	PDI-9 (19-20)	PDI-10 (15-16)	PDI-10A (14-15)	PDI-10B (12-13)
				Start Depth	19	15	17	15	19	19	19	19	19	15	14	12
				End Depth	20	16	18	16	20	20	20	20	20	16	15	13
				Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
				Sample Date	9/8/2022	9/8/2022	9/8/2022	9/8/2022	9/7/2022	9/7/2022	9/7/2022	9/6/2022	9/6/2022	9/7/2022	9/6/2022	9/7/2022
				Parent Sample							PDI-6 (19-20)					
Analyte	Units	CAS No.	Unrestricted Use SCO	Restricted Use Residential SCO												
BTEX	mg/kg															
Benzene		71-43-2	0.06	2.9	0.0012 U	0.0011 U	0.0012 U	0.0012 U	0.0011 U	0.0014 U	0.00098 U	0.0011 U	0.00099 U	0.0012 U	0.00094 U	0.0011 U
Toluene		108-88-3	0.7	100	0.0012 U	0.0011 U	0.0012 U	0.0012 U	0.0011 U	0.0014 U	0.00098 U	0.0011 U	0.00099 U	0.0012 U	0.00094 U	0.0011 U
Ethylbenzene		100-41-4	1	30	0.0012 U	0.0011 U	0.0012 U	0.0012 U	0.0011 U	0.0014 U	0.00098 U	0.0011 U	0.00099 U	0.0012 U	0.00094 U	0.0011 U
Total Xylene		1330-20-7	0.26	100	0.0024 U	0.0023 U	0.0025 U	0.0024 U	0.0021 U	0.0028 U	0.002 U	0.0021 U	0.002 U	0.0024 U	0.0019 U	0.0022 UJ
Total BTEX		TBTEX	NE	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PAH17	mg/kg															
Acenaphthene		83-32-9	20	100	0.37 J	0.2 J	0.42 U	1.5	0.17 J	0.35 U	0.35 U	0.57	3.1	0.34 U	0.34 U	0.35 U
Acenaphthylene		208-96-8	100	100	0.025 J	0.41 U	0.42 U	0.82	0.043 J	0.35 U	0.35 U	0.068 J	0.73	0.34 U	0.34 U	0.35 U
Anthracene		120-12-7	100	100	0.2 J	0.047 J	0.42 U	4.4	0.16 J	0.012 J	0.35 U	0.3 J	2.4	0.34 U	0.34 U	0.35 U
Benzo(a)anthracene		56-55-3	1	1	0.06	0.02 J	0.042 U	2.5	0.13	0.014 J	0.02 J	0.19	1.5	0.014 J	0.034 U	0.02 J
Benzo(b)fluoranthene		205-99-2	1	1	0.04 U	0.041 U	0.042 U	1.1	0.053	0.035 U	0.035 U	0.078	0.66	0.034 U	0.034 U	0.035 U
Benzo(k)fluoranthene		207-08-9	0.8	1	0.04 U	0.041 U	0.042 U	0.42	0.018 J	0.035 U	0.035 U	0.036	0.26	0.034 U	0.034 U	0.035 U
Benzo(g,h,i)perylene		191-24-2	100	100	0.4 U	0.41 U	0.42 U	0.41	0.023 J	0.35 U	0.35 U	0.033 J	0.26 J	0.34 U	0.34 U	0.35 UJ
Benzo(a)pyrene		50-32-8	1	1	0.027 J	0.041 U	0.042 U	1.4	0.068	0.035 U	0.035 U	0.11	0.85	0.034 U	0.034 U	0.035 U
Chrysene		218-01-9	1	1	0.062 J	0.021 J	0.42 U	2.5	0.13 J	0.0094 J	0.0098 J	0.2 J	1.4	0.34 U	0.34 U	0.015 J
Dibenz(a,h)anthracene		53-70-3	0.33	0.33	0.04 U	0.041 U	0.042 U	0.13	0.035 U	0.035 U	0.035 U	0.035 U	0.087	0.034 U	0.034 U	0.035 U
Fluoranthene		206-44-0	100	100	0.13 J	0.04 J	0.42 U	4.1	0.27 J	0.027 J	0.033 J	0.35	2.5	0.022 J	0.34 U	0.35 U
Fluorene		86-73-7	30	100	0.24 J	0.12 J	0.42 U	2	0.16 J	0.35 U	0.012 J	0.41	2.5	0.011 J	0.34 U	0.021 J
Indeno(1,2,3-cd)pyrene		193-39-5	0.5	0.5	0.04 U	0.041 U	0.042 U	0.46	0.025 J	0.035 U	0.035 U	0.036	0.3	0.034 U	0.034 U	0.035 U
2-Methylnaphthalene		91-57-6	NE	NE	0.021 J	0.043 J	0.42 U	0.24 J	0.35 U	0.35 U	0.35 U	0.061 J	0.34 U	0.34 U	0.34 U	0.35 U
Naphthalene		91-20-3	12	100	0.059 J	0.061 J	0.42 U	0.24 J	0.35 U	0.35 U	0.35 U	0.088 J	0.033 J	0.34 U	0.34 U	0.35 U
Phenanthrene		85-01-8	100	100	1.1	0.48	0.033 J	11	0.91	0.028 J	0.065 J	1.4	8.8	0.051 J	0.34 U	0.027 J
Pyrene		129-00-0	100	100	0.2 J	0.052 J	0.42 U	6.3	0.45	0.038 J	0.046 J	0.54	4	0.032 J	0.34 U	0.017 J
Total PAH (17)		TPAH17	NE	NE	2.494	1.084	0.033	39.52	2.61	0.1284	0.1858	4.47	29.38	0.13	ND	0.1

Appendix B

Boring Logs

GEI Consultants, Inc., P.C. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	CLIENT: National Grid PROJECT: 22 Oak Street PDI- Implementation CITY/STATE: Bay Shore, New York GEI PROJECT NUMBER: 093180-14.19	BORING LOG PAGE 1 of 1	PDI-1

GROUND SURFACE ELEVATION (FT): 22 **LOCATION:** See Boring Exploration Plan.
NORTHING: **EASTING:** **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick **DATUM VERT. / HORZ.:** NAVD 1988 / NAD83
LOGGED BY: L. Robertson **DATE START / END:** 9/8/2022 - 9/8/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 8.25 bsg

DEPTH FT.	TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.1, 0.1, 0.3, 0.2, 0.0, 0.4, 0.5, 0.5				(0'- 0.5') RCA; fine to coarse gravel, subangular; dry, Hand Cleared. (0.5'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown, Hand Cleared.
5	S1	5.0	3	0.6, 0.1, 0.9, 10.9, 9.6, 7.6			NLO	S1 (5'- 5.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown. S1 (5.5'- 8') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, moist, black.
							NLO	S2 (8'- 10') SAND WITH SILT (SW); ~80% sand, fine to coarse, ~20% fines, non plastic; moderate naphthalene-like odor, moist, black gray.
10	S2	5.0	3.75	0.9, 1.2, 1.9, 1.7, 1.0, 2.1, 2.9, 3.0			NLO	S2 (10'- 13') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black gray.
							NLO	S2 (13'- 15') SAND WITH SILT AND GRAVEL (SP); ~60% sand, fine to medium, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black.
15	S3	5.0	4.17	0.9, 3.7, 1.9, 1.2, 1.3, 0.9, 1.0, 2.0, 1.0			NLO	S3 (15'- 16') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black.
							NLO	S3 (16'- 20') SAND WITH SILT (SW); ~80% sand, fine to medium, ~20% fines, non plastic; moderate naphthalene-like odor, moist, gray brown.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

GEI Consultants, Inc., P.C.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG
PAGE 1 of 1
PDI-2

GROUND SURFACE ELEVATION (FT): 23
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/8/2022 - 9/8/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 8.25 bsg

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.0, 0.1, 0.0, 0.0, 0.0, 0.2, 0.1, 0.0				(0'- 0.5') CONCRETE; Hand Cleared.
								(0.5'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown, Hand Cleared.
5	S1	5.0	4	10.2, 11.3, 5.5, 3.6, 2.1, 10.1, 5.3, 19.1			NLO	S1 (5'- 6.5') SAND WITH SILT AND GRAVEL (SP); ~80% sand, medium sand, ~20% fines, non plastic; moderate naphthalene-like odor, moist, black.
							NLO	S1 (6.5'- 8') SAND WITH SILT AND GRAVEL (SM); ~45% sand, fine sand, ~45% fines, low plasticity, ~10% gravel, fine gravel, subangular; moderate naphthalene-like odor, moist, black gray.
							NLO	S1 (8'- 10') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non-plastic to low plasticity; moderate naphthalene-like odor, moist, brown.
10	S2	5.0	4	20.1, 19.6, 7.3, 7.9, 8.1, 10.9, 19.6, 12.3			NLO	S2 (10'- 11.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non-plastic to low plasticity; moderate naphthalene-like odor, wet, black.
								S2 (11.5'- 13') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non-plastic to low plasticity; wet, brown.
							NLO	S2 (13'- 13.5') SAND WITH GRAVEL (SP); ~80% sand, coarse, ~20% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, black.
							NLO	S2 (13.5'- 14') SAND WITH GRAVEL (SP); ~80% sand, coarse, ~20% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, black gray.
							NLO	S2 (14'- 15') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non-plastic to low plasticity; moderate naphthalene-like odor, wet, black.
15	S3	5.0	3.3	3.9, 4.5, 1.9, 3.0,1.5, 0.9, 0.3			NLO	S3 (15'- 20') SAND WITH SILT AND GRAVEL (SW); ~70% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~10% fines, non-plastic to low plasticity; moderate naphthalene-like odor, wet, black.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

GEI Consultants, Inc., P.C.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG
PAGE 1 of 1
PDI-3

GROUND SURFACE ELEVATION (FT): 24
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/8/2022 - 9/8/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 6.75 bsg

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.0, 0.0, 0.1, 0.0, 0.0, 0.1, 0.1, 0.0				(0'- 0.5') CONCRETE; Hand Cleared. (0.5'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown, Hand Cleared.
5	S1	5.0	3.5	0.1, 0.1, 0.3, 0.9, 10.1, 11.2, 13.9				S1 (5'- 6') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown.
								S1 (6'- 6.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moist, black.
							NLO	S1 (6.5'- 7') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moist, tan.
							NLO	S1 (7'- 8') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black. S1 (8'- 10') SAND WITH SILT AND GRAVEL (SW); ~70% sand, fine to coarse sand, ~20% fines, non-plastic to low plasticity, ~10% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, black.
10	S2	5.0	4	1.9, 1.8, 1.9, 1.5, 14.6, 23.2, 9.8, 4.7			NLO	S2 (10'- 15') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, tan.
15	S3	5.0	2.83	4.7, 1.9, 19.2, 21.6, 11.7, 8.7, 6.2, 1.9, 1.7				S3 (15'- 17') SAND WITH SILT AND GRAVEL (SW); ~80% sand, fine to coarse sand, ~20% fines, non plastic; wet, light brown.
							NLO	S3 (17'- 18') SAND WITH GRAVEL (SP); ~80% sand, coarse, ~20% gravel, fine gravel, subangular; strong naphthalene-like odor, wet, black gray.
							NLO	S3 (18'- 20') SAND WITH SILT AND GRAVEL (SW); ~75% sand, fine to coarse sand, ~20% fines, non plastic, ~5% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, gray.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

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(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG
PAGE 1 of 1
PDI-4

GROUND SURFACE ELEVATION (FT): 19
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/8/2022 - 9/8/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 5.50 bsg

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.1, 0.0, 0.1, 0.1, 0.0, 0.3, 0.5, 0.7				(0'- 0.5') CONCRETE; Hand Cleared.
								(0.5'- 4') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; max. size 3 in., dry, brown, Hand Cleared.
							NLO	(4'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, moist, black.
5	S1	5.0	3.75	10.9, 11.3, 12.1, 12.2, 13.9, 11.3, 10.1, 6.3			NLO	S1 (5'- 5.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black.
							NLO	S1 (5.5'- 9') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, tan.
							NLO	S1 (9'- 10') SAND WITH SILT AND GRAVEL (SP); ~80% sand, fine to medium sand, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black.
10	S2	5.0	4.5	23.9, 25.6, 11.2, 10.9, 6.3, 7.2, 5.3, 6.1, 3.2			NLO	S2 (10'- 11') SAND WITH GRAVEL (SW); ~95% sand, fine to coarse sand, ~5% gravel, fine gravel, subangular; strong naphthalene-like odor, wet, black, NAPL Coated, Blebs.
							NLO	S2 (11'- 15') SAND WITH SILT AND GRAVEL (SP); ~60% sand, fine to medium sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black gray.
15	S3	5.0	4.5	0.9, 0.8, 1.1, 1.3, 0.1, 0.2, 0.3, 0.1, 0.6				S3 (15'- 20') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, tan.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

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GEI Consultants

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CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG

PAGE 1 of 1

PDI-5

GROUND SURFACE ELEVATION (FT): 21
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/7/2022 - 9/7/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 5.50 bsg

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.1, 0.0, 0.0, 0.9, 0.0, 0.1, 0.1, 0.0				(0'- 0.5') CONCRETE; Hand Cleared. (0.5'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown, Hand Cleared.
5	S1	5.0	3	10.6, 20.9, 19.6, 10.9, 11.2, 10.9			NLO	S1 (5'- 5.5') SAND WITH SILT (SP); ~80% sand, fine sand, ~20% fines, non plastic; moderate naphthalene-like odor, moist, black.
							NLO	S1 (5.5'- 8') SAND WITH GRAVEL (SP); ~80% sand, coarse sand, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black.
							NLO	S1 (8'- 10') SILT WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20% gravel, fine gravel, subangular; strong naphthalene-like odor, wet, black, NAPL Coated, Blebs.
10	S2	5.0	4	11.6, 10.6, 13.2, 20.6, 13.1, 12.6, 11.0, 10.9			NLO	S2 (10'- 11') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, black.
							NLO	S2 (11'- 15') SAND WITH SILT AND GRAVEL (SW); ~70% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~10% fines, non plastic; moderate naphthalene-like odor, wet, black.
15	S3	5.0	4	10.7, 10.8, 10.7, 12.3, 12.7, 11.9, 9.6, 1.1			NLO	S3 (15'- 18') SAND WITH SILT AND GRAVEL (SP); ~75% sand, fine to medium, ~20% fines, non plastic, ~5% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, brown gray.
								S3 (18'- 20') SAND WITH SILT (SW); ~80% sand, fine to coarse, ~20%fines, non plastic; wet, tan.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

GEI Consultants, Inc., P.C. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	CLIENT: National Grid PROJECT: 22 Oak Street PDI- Implementation CITY/STATE: Bay Shore, New York GEI PROJECT NUMBER: 093180-14.19	BORING LOG PAGE 1 of 2 **PDI-6**

GROUND SURFACE ELEVATION (FT): 20
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 25.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/7/2022 - 9/7/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 5.75 bsg

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.1, 0.0, 0.2, 0.0, 0.0, 0.0, 0.0, 0.0				(0'- 0.5') CONCRETE; Hand Cleared. (0.5'- 5') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular; dry, brown, Hand Cleared.
5	S1	5.0	4	0.1, 0.0, 9.6, 10.3, 9.7, 8.3, 7.3, 7.3			NLO	S1 (5'- 10') GRAVEL (GP); ~100% gravel, fine gravel, subangular; strong naphthalene-like odor, wet, black, NAPL Coated, Blebs.
10	S2	5.0	5	5.3, 2.1, 2.3, 2.9, 2.6, 1.7, 1.8, 1.7, 1.7, 1.9			NLO	S2 (10'- 11.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, tan.
							NLO	S2 (11.5'- 13') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, black.
							NLO	S2 (13'- 15') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, grayish-black.
15	S3	5.0	5	0.9, 0.7, 0.3, 0.4, 0.7, 5.6, 4.9, 5.7, 5.8, 5.8				S3 (15'- 17') SAND WITH SILT (SP); ~80% sand, fine to medium, ~20% fines, non-plastic to low plasticity; wet, tan.
							NLO	S3 (17'- 18') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, brown.
							NLO	S3 (18'- 18.5') SANDY SILT (SW); ~80% sand, fine to coarse sand, ~20% fines, non-plastic to low plasticity; moderate naphthalene-like odor, wet, tan.
							NLO	S3 (18.5'- 20') SAND WITH SILT (SP); ~80% sand, fine to medium, ~20% fines, non-plastic to low plasticity; moderate naphthalene-like odor, wet, dark brown.
20	S4	5.0	4.5	4.7, 3.8, 4.1, 3.2, 3.1, 1.7, 1.1, 1.1, 1.1				S4 (20'- 22.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, tan.
								S4 (22.5'- 25') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, light brown.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

GEI Consultants, Inc., P.C.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG

PDI-6

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
25								Bottom of borehole at 25.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

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455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG

PAGE 1 of 1

PDI-8

GROUND SURFACE ELEVATION (FT): 22
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/6/2022 - 9/6/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 8.75 bsg

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.0, 0.0, 0.1, 0.3, 0.0, 0.1, 0.0, 0.0				(0'- 0.5') CONCRETE; Hand Cleared. (0.5'- 5') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular; dry, brown, Hand Cleared.
5	S1	5.0	3	0.0, 10.3, 19.7, 23.2, 26.2				S1 (5'- 8') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular; moist, brown.
							NLO	S1 (8'- 10') SAND WITH SILT (SW); ~80% sand, fine to coarse sand, ~20% fines, non plastic; strong naphthalene-like odor, moist, black gray.
10	S2	5.0	5	11.6, 12.2, 19.7, 21.2, 19.6, 11.2, 19.7, 10.3, 29.6, 10.1			NLO	S2 (10'- 14') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black brown.
							NLO	S2 (14'- 15') SAND WITH SILT (SP); ~80% sand, fine to coarse sand, ~20% fines, non plastic; moderate naphthalene-like odor, moist, grayish-black.
15	S3	5.0	5	12.3, 19.6, 17.2, 16.3, 15.2, 9.6, 8.1, 1.3, 2.3, 1.6			NLO	S3 (15'- 19') SAND WITH SILT (SW); ~80% sand, fine to coarse sand, ~20% fines, non plastic; strong naphthalene-like odor, wet, black, NAPL Coated, Blebs.
20								S3 (19'- 20') SAND WITH SILT (SW); ~80% sand, fine to coarse sand, ~20% fines, non plastic; moist, tan. Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

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455 Winding Brook Drive
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(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG

PDI-9

GROUND SURFACE ELEVATION (FT): 22
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/6/2022 - 9/6/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 6.50 bsg

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.1, 0.0, 0.0, 0.0, 0.2, 0.1, 0.0, 0.0, 0.0				(0'- 0.5') CONCRETE; Hand Cleared. (0.5'- 5') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse sand, ~20% gravel, fine gravel, subangular; dry, brown, Hand Cleared.
5	S1	5.0	3	0.9, 0.7, 0.7, 1.3, 1.9, 3.7				S1 (5'- 6') SAND WITH SILT (SP); ~80% sand, fine to medium, ~20% fines, non plastic; moist, brown. S1 (6'- 8') SAND WITH SILT AND GRAVEL (SW); ~75% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~5% fines, non plastic; wet, grayish brown.
							NLO	S1 (8'- 10') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20% gravel, fine gravel, subangular; moderate naphthalene-like odor, wet, black.
10	S2	5.0	5	3.2, 4.6, 3.9, 3.7, 5.9, 11.6, 7.6, 5.2, 3.6, 2.1				S2 (10'- 12') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to medium, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, brown.
							NLO	S2 (12'- 13') SAND WITH SILT (SP); ~80% sand, fine to medium, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black gray.
								S2 (13'- 15') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to medium, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, light brown.
15	S3	5.0	5	2.2, 2.3, 4.6, 7.3, 13.9, 11.6, 23.9, 1.7, 1.3, 1.2				S3 (15'- 16') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to medium, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, light brown.
							NLO	S3 (16'- 16.5') SAND WITH SILT (SW); ~80% sand, fine to medium, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black gray.
								S3 (16.5'- 17') SAND WITH GRAVEL (SW); ~80% sand, fine to medium, ~20% gravel, fine gravel, subangular; wet, light brown.
								S3 (17'- 18') SAND WITH GRAVEL (SW); ~80% sand, fine to medium, ~20% gravel, fine gravel, subangular; wet, black.
								S3 (18'- 20') SAND WITH SILT AND GRAVEL (SW); ~75% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~5% fines, non plastic; wet, dark brown.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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ppm = PARTS PER MILLION
IN. = INCHES
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GEI Consultants

GEI Consultants, Inc., P.C.
455 Winding Brook Drive
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(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG

PAGE 1 of 1

PDI-10

GROUND SURFACE ELEVATION (FT): 23
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/7/2022 - 9/7/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 8.25 bsg

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.0, 0.0, 0.1, 0.2, 0.0, 0.0, 0.0, 0.0				(0'- 0.5') CONCRETE; fine to coarse gravel, subangular; dry, Hand Cleared. (0.5'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; dry, brown, Hand Cleared.
5	S1	5.0	4	0.3, 0.4, 0.9, 1.7, 2.3, 2.2, 2.4, 2.9			NLO	S1B (5'- 9') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, moist, black gray.
							NLO	(9'- 10') SAND WITH SILT (SW); ~80% sand, fine to coarse, ~20% fines, non plastic; moderate naphthalene-like odor, wet, brown.
10	S2	5.0	5	3.1, 3.3, 3.9, 5.3, 6.1, 2.3, 0.9, 0.1, 0.1, 0.2,			NLO	(10'- 12.5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black gray.
								(12.5'- 15') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, tan.
15	S3	5.0	5	0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.1, 0.0, 0.0				S2 (15'- 20') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; wet, tan.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

GEI Consultants

GEI Consultants, Inc., P.C.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementation
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

BORING LOG
PAGE 1 of 1
PDI-10A

GROUND SURFACE ELEVATION (FT): 23
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/6/2022 - 9/6/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 6.00 bsg

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.0, 0.0, 0.0, 0.0,				(0'- 0.5') CONCRETE; fine to coarse gravel, subangular; dry, Hand Cleared. (0.5'- 5') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20% gravel, fine gravel, subangular; moist, brown, Hand Cleared.
5	S1	5.0	3	0.0, 0.1, 0.0, 0.0, 0.1, 0.1				S1 (5'- 7.5') SAND WITH SILT AND GRAVEL (SW); ~75% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~5% fines, non plastic; wet, brown.
								S1 (7.5'- 10') SAND WITH SILT AND GRAVEL (SP); ~70% sand, fine to medium sand, ~20% gravel, fine gravel, subangular, ~10% fines, non plastic; wet, tan.
10	S2	5.0	5	0.3, 0.4, 0.3, 0.7, 1.9, 2.3, 1.7, 1.9, 0.1, 0.2				S2 (10'- 12') SAND WITH SILT AND GRAVEL (SP); ~70% sand, fine to medium sand, ~20% gravel, fine gravel, subangular, ~10% fines, non plastic; wet, tan.
							NLO	S2 (12'- 13') SAND WITH SILT (SW); ~80% sand, fine to coarse sand, ~20% fines, non plastic; moderate naphthalene-like odor, wet, black.
								S2 (13'- 15') SAND WITH SILT AND GRAVEL (SW); ~75% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~5% fines, non plastic; wet, tan.
15	S3	5.0	5	0.1, 0.0, 0.1, 0.0, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0				S3 (15'- 20') SAND WITH SILT AND GRAVEL (SW); ~75% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~5% fines, non plastic; wet, tan.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

GEI Consultants
GEI Consultants, Inc., P.C.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: National Grid
PROJECT: 22 Oak Street PDI- Implementatior
CITY/STATE: Bay Shore, New York
GEI PROJECT NUMBER: 093180-14.19

PDI-10B

GROUND SURFACE ELEVATION (FT): 23
LOCATION: See Boring Exploration Plan.
NORTHING:
EASTING:
TOTAL DEPTH (FT): 20.00
DRILLED BY: Coastal Environmental / J. Fitzpatrick
DATUM VERT. / HORZ.: NAVD 1988 / NAD83
LOGGED BY: L. Robertson
DATE START / END: 9/7/2022 - 9/7/2022
DRILLING DETAILS: Geoprobe/5 ft long plastic sleeves / Geoprobe 6610 DT / Core Size: 60 in. / Core Type: Macrocore
WATER LEVEL ELEVATIONS (FT): 7.00 bsg

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	SOIL / BEDROCK DESCRIPTION
0		5.0	5	0.0, 0.0, 0.0, 0.0, 0.0, 0.1, 0.0, 0.0, 0.0, 0.0				(0'- 0.5') CONCRETE; fine to coarse gravel, subangular; dry, Hand Cleared. (0.5'- 5') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20%gravel, fine gravel, subangular, ~20% fines, non plastic; moist, brown, Hand Cleared.
5	S1	5.0	3	0.1, 0.0, 0.0, 0.1, 0.0, 0.0				S1 (5'- 7.5') SAND WITH SILT AND GRAVEL (SW); ~70% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~10% fines, non plastic; wet, tan. S1 (7.5'- 10') SAND WITH SILT AND GRAVEL (SW); ~70% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~10% fines, non plastic; wet, black.
10	S2	5.0	5	0.0, 0.1, 0.3, 0.4, 0.1, 0.2, 0.1, 0.3, 0.1, 0.0				S2 (10'- 11') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20%gravel, fine gravel, subangular; wet, gray. S2 (11'- 12') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20%gravel, fine gravel, subangular; wet, black. S2 (12'- 13') SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20%gravel, fine gravel, subangular; wet, tan. S2 (13'- 15') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moist, gray.
15	S3	5.0	5	0.0, 0.0, 0.0, 0.0, 0.0, 0.1, 0.0, 0.1, 0.0, 0.0				S3 (15'- 20') SAND WITH SILT AND GRAVEL (SW); ~60% sand, fine to coarse, ~20% gravel, fine gravel, subangular, ~20% fines, non plastic; moist, tan.
20								Bottom of borehole at 20.0 feet. End of Boring. Backfilled with sand and 6" of cement.

NOTES:

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REC = RECOVERY LENGTH OF SAMPLE
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ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

Asphalt

Concrete

Fill (made ground)

USCS Well-graded Gravel

USCS Silt

USCS Low Plasticity Organic silt or clay

USCS Low Plasticity Organic silt or clay with shells

USCS Peat

USCS Silty Sand

USCS Poorly-graded Sand

USCS Poorly-graded Sand with Silt

USCS Well-graded Sand

	Blebs, Globs, Lenses, Coatings, Sheens and Tar / Naphtha Odors
	Petroleum Sheen / Staining Odors
	Lenses with Tar Saturation and Tar / Naphtha Odors
	Tar Saturated
	Tar Staining Sheen and Tar / Naphtha Odors

VISUAL IMPACT COLORS KEY OU-4 SISCO 2010 (CMB).GPJ GEI CONSULTANTS.GDT 6/18/10

National Grid

GEI Consultants

Project

Figure

GEI Consultants, Inc.
455 Winding Brook Road
Glastonbury, CT 06033
(860) 368-5300

CLIENT:	National Grid
PROJECT:	OU-4 Post S-ISCO
CITY/STATE:	Bay Shore, NY
GEI PROJECT NUMBER:	093180-4-1402

BORING LOG

SB-B2

GROUND SURFACE ELEVATION (FT):	18.3	LOCATION:	OU-4
NORTHING: 204058.4107	EASTING: 1190616.4419	TOTAL DEPTH (FT):	30.00
DRILLED BY:	Zebra Environmental	DATUM VERT. / HORZ.:	NAD 83 / NGVD 88
LOGGED BY:	Chris Morris	DATE START / END:	4/21/2010 - 4/21/2010
DRILLING DETAILS:	Geoprobe		
WATER LEVEL DEPTHS (FT):			

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		5.0		0.0					(0'- 3') SILTY SAND (SM); ~70% sand, fine to medium, ~20% fines, ~10% gravel, fine to coarse; dark brown, FILL, (brick fragments and concrete).
				0.0					
				0.0					
				0.0					
				0.0					
				0.0					
				0.0					(3'- 4') SILTY SAND WITH GRAVEL (SM); ~60% sand, fine to coarse, ~20% gravel, ~20% fines; wet, brown, FILL, loose.
				0.0					
				49.3			PLO		(4'- 4.5') SILTY SAND (SM); ~60% sand, fine to medium, ~30% fines, ~10% gravel, fine; moderate petroleum-like odor, black, FILL, wood fragments, loose, soft, hydrocarbon-like odor, slight sheen.
				19.3			PLO		(4.5'- 5') SILTY SAND WITH GRAVEL (SM); ~60% sand, fine to medium, ~20% gravel, fine, ~20% fines; moderate petroleum-like odor, black, FILL, wood fragments, loose, soft, hydrocarbon-like odor, slight sheen, interval stained glove when squeezed.
5	S-1	5.0	3	19.4			PLO		S-1 (5'- 5.2') SILTY SAND WITH GRAVEL (SM); ~60% sand, fine to medium, ~20% gravel, fine, ~20% fines; moderate petroleum-like odor, black, FILL, wood fragments, loose, soft, hydrocarbon-like odor, slight sheen, interval stained glove when squeezed.
				44.7			PLO	B2 (5.5-6.5)'	(5.2'- 5.8') SILTY SAND (SM); ~70% sand, fine to medium, ~25% fines, ~5% gravel, fine; moderate petroleum-like odor, wet, gray, hydrocarbon-like odor/NLO, stained, slight sheen.
				44.1			NLO		(5.8'- 6.6') WIDELY GRADED SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~15% gravel, fine, ~5% fines; moderate naphthalene-like odor, brown red, sheen, slight tar coating ~5.8-6'. Stained ~6.3-6.4'.
				10.0					(6.6'- 7.8') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, fine to coarse, ~15% gravel, fine; trace fines, moderate naphthalene-like odor, black gray, stained ~6.6-6.7'. Band of light brown soil at ~6.9-7'. Moderate tar coating ~7.25-7.5'.
				17.2			NLO	B2 (7-7.5)'	
				4.1					
							NLO		(7.8'- 8') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, fine to coarse, ~15% gravel, fine; moderate naphthalene-like odor, brown gray, slightly stained, septic-like odor with NLO.
10	S-2	5.0	2.8	5.8			NLO		S-2 (10'- 10.6') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, fine to coarse, ~15% gravel, fine; moderate
				1.0			NLO		

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
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CiLO= CITRUS LIKE ODOR

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
				0.4					naphthalene-like odor, brown gray, slightly stained, septic-like odor with NLO.
				16.8			NLO	B2 (11.5-12)'	(10.6'- 11.2') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, ~15% gravel; slight naphthalene-like odor, brown red, citrus-like odor.
				6.5			NLO		(11.2'- 11.75') NARROWLY GRADED SAND (SP); ~95% sand, fine to coarse, ~5% gravel, fine; slight naphthalene-like odor, light brown, slight citrus-like odor.
				8.5			NLO		(11.75'- 12.25') WIDELY GRADED SAND WITH GRAVEL (SW); ~80% sand, fine to coarse, ~20% gravel, fine to coarse; moderate naphthalene-like odor, brown, heavily tar coated. (12.25'- 12.8') NARROWLY GRADED SAND (SP); ~90% sand, fine to medium; little coarse sand, little fine gravel, moderate naphthalene-like odor, light brown, slight citrus-like odor.
15	S-3	5.0	2.75	1.4					S-3 (15'- 16.7') NARROWLY GRADED SAND (SP); ~90% sand, fine to medium; little coarse sand, little fine gravel, moderate naphthalene-like odor, light brown, slight citrus-like odor. Small tar saturated seam <0.5" at ~15.25'. Small tar saturated seam <0.5" at ~15.7'.
				1.7			NLO		
				0.8					
				0.6					(16.7'- 17.25') NARROWLY GRADED SAND (SP); ~90% sand; little coarse sand, little fine gravel, light brown.
				0.3					(17.25'- 17.75') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine to coarse; brown red.
				1.2					
20	S-4	5.0	2.75	0.2					S-4 (20'- 21.9') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine to coarse; red brown.
				0.0					
				0.0					
				0.0					
				0.0					(21.9'- 22.75') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine to coarse; light brown.
				0.0					

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GEI Consultants, Inc.
455 Winding Brook Road
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(860) 368-5300

CLIENT:	National Grid
PROJECT:	OU-4 Post S-ISCO
CITY/STATE:	Bay Shore, NY
GEI PROJECT NUMBER:	093180-4-1402

BORING LOG

SB-B2

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25	S-5	5.0	3.2	0.0					S-5 (25'- 26.75') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine to coarse; light brown.
				0.0					
				0.0					
				0.0					
				0.0					(26.75'- 28.2') NARROWLY GRADED SAND (SW); ~95% sand, fine to medium, ~5% gravel, fine; light brown / brown.
				0.0					
				0.0					
				0.0					
30									Bottom of borehole at 30.0 feet.

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GEI PROJECT NUMBER: 093180-4-1402

BORING LOG

SB-C2

GROUND SURFACE ELEVATION (FT): 19.6
LOCATION: OU-4
NORTHING: 204046.4875
EASTING: 1190632.4171
TOTAL DEPTH (FT): 30.00
DRILLED BY: Zebra Environmental
DATUM VERT. / HORZ.: NAD 83 / NGVD 88
LOGGED BY: John Schafer
DATE START / END: 4/21/2010 - 4/21/2010
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT):

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	ODOR	ANALYZED SAMPLE ID
0		5.0	1	0.0		
				0.1		
				0.1		
5	S-1	5.0		0.2	NLO	
				2	NLO	
				16	NLO	C2 (6-7)'
				7	NLO	
				10		
10	S-2	5.0	2.5	5.7		
				18		C2 (10.5-12)'
				8.5		
				5		
				11	NLO	
15	S-3	5.0	2.5	5		C2 (15-16)'
				17	NLO	
				8		
				5	NLO	
				4		

SOIL / BEDROCK DESCRIPTION

(0'- 1') SILT WITH GRAVEL (ML); some fine to coarse gravel, brown, FILL, silty matrix with concrete dust/blocks.

(3'- 3.2') PEAT (PT); moist, brown, soft, plastic.
(3.2'- 3.7') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, with fine to coarse gravel, brown.

S-1 (5'- 5.25') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, with fine gravel, some coarse gravel, naphthalene-like odor, wet, brown.
(5.25'- 5.75') GRAVEL LENSE (GW); slight naphthalene-like odor.
(5.75'- 6') SILT (ML); moderate naphthalene-like odor, wet, brown, soft.
(6'- 7') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine to coarse gravel, strong naphthalene-like odor, black, stained.

S-2 (10'- 15') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine to coarse gravel, naphthalene-like odor, brown, stained to NAPL coated with sheen, gravel lense at ~10'.
Heavily NAPL coated lenses at ~10.25'.
Gravel lense at ~10.5', heavily NAPL coated lenses at ~10.5'.
Gravel lense at ~11'.
Gravel lense at ~12'.
Heavily NAPL coated lenses at ~12.5'.

S-3 (15'- 16.25') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine to coarse gravel, naphthalene-like odor, brown, stained to NAPL coated.
Gravel lense at ~15.25' NAPL saturated at ~15.25' and 15.75'.
(16.25'- 17.5') WIDELY GRADED SAND (SW); fine to coarse sand, trace fine gravel, slight naphthalene-like odor, orange brown, sheen.

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BORING LOG

SB-C2

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
20	S-4	5.0	3	0.6 0.0 0.0 0.0 0.0 0.0			CiLO		S-4 (20'- 25') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine gravel, trace coarse gravel, slight citrus-like odor, brown to orange brown. Gravel lense at ~ 22.75'.
25	S-5	5.0	2.25	0.1 0.0 0.0 0.0 0.0			CiLO		S-5 (25'- 30') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine gravel, slight citrus-like odor, wet, orange brown.
30									Bottom of borehole at 30.0 feet.

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GEI Consultants, Inc. 455 Winding Brook Road Glastonbury, CT 06033 (860) 368-5300	CLIENT: National Grid PROJECT: OU-4 Post S-ISCO CITY/STATE: Bay Shore, NY GEI PROJECT NUMBER: 093180-4-1402	BORING LOG PAGE 1 of 2 SB-D3

GROUND SURFACE ELEVATION (FT): ____ LOCATION: OU-4
NORTHING: ____ EASTING: ____ TOTAL DEPTH (FT): 30.00
DRILLED BY: Zebra Environmental DATUM VERT. / HORZ.: NAD 83 / NGVD 88
LOGGED BY: Chris Morris DATE START / END: 4/21/2010 - 4/21/2010
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): ∇ 2.50 4/21/2010

DEPTH FT.	TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		5.0		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0					(0'- 0.2') CONCRETE. (0.2'- 0.5') CONCRETE, rubble. (0.5'- 1.5') SILTY SAND WITH GRAVEL (SM); ~70% sand, fine to coarse, ~15% gravel, fine to coarse, ~15% fines; dry, brown, FILL. (1.5'- 2.5') SILTY SAND WITH GRAVEL (SM); ~70% sand, fine to coarse, ~15% gravel, fine to coarse, ~15% fines; dry, dark brown, FILL, (brick and slag to 2'). (2.5'- 3.5') SILTY SAND (SM); ~70% sand, fine to medium, ~20% fines, ~10% gravel, fine to coarse; wet, brown. (3.5'- 5') WIDELY GRADED SAND WITH SILT (SW-SM); ~80% sand, fine to coarse, ~10% gravel, fine to coarse, ~10% fines; wet, brown, loose.
5	S-1	5.0	3.4	0.0 0.4 0.1 1.4 3.5 1.2 0.5			OLO NLO NLO NLO CiLO	D3 (6.5-7.5)'	S-1 (5'- 5.3') WIDELY GRADED SAND WITH SILT (SW-SM); ~80% sand, fine to coarse, ~10% gravel, fine to coarse, ~10% fines; wet, brown, loose. (5.3'- 6.1') PEAT (PT); some organic matter, moderate organic-like odor, dark brown. (6.1'- 6.75') SILTY SAND (SM); ~60% sand, fine to medium, ~35% fines, ~5% gravel, fine; slight naphthalene-like odor, wet, gray. (6.75'- 7.1') WIDELY GRADED SAND WITH GRAVEL (SW); ~70% sand, fine to coarse, ~30% gravel, fine to coarse; slight naphthalene-like odor, sheen and tar blebs from 6.8-6.9'. (7.1'- 7.5') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, fine to coarse, ~15% gravel, fine to coarse; slight naphthalene-like odor, dark brown / red. (7.5'- 10') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, fine to coarse, ~15% gravel, fine to coarse; citrus-like odor, light brown / red.
10	S-2	5.0	2.5	0.4 1.2 18.3 3.9 7.9			CiLO CiLO	D3 (12-12.5)'	S-2 (10'- 10.4') WIDELY GRADED SAND WITH GRAVEL (SW); ~85% sand, fine to coarse, ~15% gravel, fine to coarse; citrus-like odor, light brown / red. (10.4'- 15') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine; citrus-like odor, light brown / orange. (11.1'- 11.14') heavily tar coated with napthalene-like odor. (11.4'- 11.44') heavily tar coated with napthalene-like odor.
15	S-3	5.0	2.5	38.2 11.8 1.3 0.4 0.1			CiLO CiLO CiLO		S-3 (15'- 15.3') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine; citrus-like odor, light brown / orange. (15.3'- 15.8') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine; citrus-like odor, gray / black, staining, naphthalene-like odor. (15.8'- 16.7') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; citrus-like odor, light brown / orange. (16.7'- 20') WIDELY GRADED SAND (SW); ~90% sand, fine to

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(860) 368-5300

CLIENT: National Grid
PROJECT: OU-4 Post S-ISCO
CITY/STATE: Bay Shore, NY
GEI PROJECT NUMBER: 093180-4-1402

BORING LOG
PAGE 2 of 2
SB-D3

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
									coarse, ~10% gravel, fine; light brown / orange.
20	S-4	5.0	2.75	0.0 0.0 0.0 0.0 0.0 0.0					S-4 (20'- 25') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine; light brown / orange.
25	S-5	5.0	2.4	0.0 0.0 0.0 0.0 0.0					S-5 (25'- 30') WIDELY GRADED SAND (SW); ~95% sand, fine to coarse, ~5% gravel, fine; light brown / orange.
30									Bottom of borehole at 30.0 feet.

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BORING LOG

PAGE 1 of 2

SB-F1

GROUND SURFACE ELEVATION (FT):
LOCATION: OU-4
NORTHING: **EASTING:**
TOTAL DEPTH (FT): 30.00
DRILLED BY: Zebra Environmental
DATUM VERT. / HORZ.: NAD 83 / NGVD 88
LOGGED BY: John Schafer
DATE START / END: 4/20/2010 - 4/20/2010
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT):

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		5.0		0.0 0.0 0.0					(0'- 3') SILT WITH GRAVEL (ML); with fine to coarse gravel, moist, brown, FILL, silty matrix with brick.
				0.0 0.0					(3'- 5') SILTY SAND WITH GRAVEL (SM); fine to coarse sand, some fine to coarse gravel, moist to wet, brown, wet at ~5'.
5	S-1	5.0	3	0.0 0.0 0.5 0.4 1 2 2			PLO	F1 (7.5-8)'	S-1 (5'- 5.5') SILTY SAND WITH GRAVEL (SM); fine to coarse sand, some fine to coarse gravel, wet, brown. (5.5'- 10') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine to coarse gravel, brown, gravel lense at ~5.5'. Gravel lense at ~6.5'. Gravel lense at ~7'. Moderate petroleum-like odor, black stained sand at ~8', hydrocarbon-like odor with some fine gravel.
10	S-2	5.0	2	0.0 0.0 2.0 0.5			CiLO PLO		S-2 (10'- 15') NARROWLY GRADED SAND WITH GRAVEL (SP); coarse sand, some fine to medium gravel, with fine gravel, some coarse gravel, slight petroleum-like odor, black to brown. Gravel lense at~10.5-11'. (11'- 12') slight citrus-like odor, (weathered).
15	S-3	5.0	2.5	0.0 0.0 0.0 0.0 0.0					S-3 (15'- 20') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine to coarse gravel, brown, gravel lense at ~15-15.5'. Gravel lense at ~16.25-16.5'.

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BORING LOG

PAGE 2 of 2

SB-F1

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
20	S-4	5.0	2.5	0.0 0.0 0.0 0.0 0.0					S-4 (20'- 25') NARROWLY GRADED SAND (SP); fine to medium sand, some coarse sand, trace fine gravel, wet, brown.
25	S-5	5.0	2.5	0.0 0.0 0.0 0.0 0.0					S-5 (25'- 30') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine gravel, trace coarse gravel, brown. Gravel lense at ~25.5'.
30									Bottom of borehole at 30.0 feet.

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ENVIRONMENTAL BORING LOG OU-4 SISCO 2010 (CMB).GPJ GEI CONSULTANTS.GDT 6/18/10

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BORING LOG

PAGE 1 of 2

SB-F2

GROUND SURFACE ELEVATION (FT):
NORTHING:
EASTING:
DRILLED BY: Zebra Environmental
LOGGED BY: John Schafer/Chris Moriss
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT):
LOCATION: OU-4
TOTAL DEPTH (FT): 28.00
DATUM VERT. / HORZ.: NAD 83 / NGVD 88
DATE START / END: 4/20/2010 - 4/20/2010

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		5.0		0.0 0.0 0.0 0.0 0.0					(0'- 1') SILT WITH GRAVEL (ML); some fine to coarse gravel, brown, FILL, silty matrix, some plastic, brick. (1'- 5') SILTY SAND WITH GRAVEL (SM); with fine to coarse gravel, brown, FILL, with glass, brick.
5	S-1	4.0	3	0.0 0.0 0.0 92 166 283			PLO	F2 (7-8)'	S-1 (5'- 5.5') SILTY SAND (SM); fine to coarse sand, some fine gravel, brown, sample contains peat. (5.5'- 9') WIDELY GRADED SAND (SW); fine to coarse sand, trace fine to coarse gravel, strong petroleum-like odor, brown.
10	S-2	3.0	2.5	141 19 7 3 27			PLO		S-2 (9'- 12') WIDELY GRADED SAND WITH GRAVEL (SW); fine to coarse sand, some fine to coarse gravel, strong petroleum-like odor, light black, stained. Gravel lense at ~10'.
	S-3	4.0	1.5	3 3.5 7				F2 (12-12.6)'	S-3 (12'- 16') NARROWLY GRADED SAND WITH GRAVEL (SP); coarse sand, some fine sand, some coarse gravel, gray. Tar saturated lense at ~12.25'.
15	S-4	4.0	2.5	2.3 2.0 4.7 3.6			NLO NLO NLO		S-4 (16'- 16.2') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; naphthalene-like odor, dark gray, stained, sheen. (16.2'- 16.75') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; naphthalene-like odor, dark gray,

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BORING LOG

SB-F2

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ODOR	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
				6.1					stained. (16.75'- 17.75') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; slight naphthalene-like odor, light gray, slightly stained. (17.75'- 20') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; brown.
20	S-5	4.0	2.4	17.8			NLO		S-5 (20'- 20.5') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; naphthalene-like odor, light brown.
				5.9			NLO		(20.5'- 21') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; slight naphthalene-like odor, light brown.
				0.3 0.8 0.2					(21'- 24') WIDELY GRADED SAND (SW); ~90% sand, fine to coarse, ~10% gravel, fine; light brown.
	S-6	4.0	2	1.5			NLO		S-6 (24'- 24.5') NARROWLY GRADED SAND (SP); ~95% sand, fine to medium, ~5% gravel, fine; slight naphthalene-like odor, brown, gravel layer at ~24.25'.
25				0.9 1.9 0.7					(24.5'- 24.5') NARROWLY GRADED SAND (SP); ~95% sand, fine to medium, ~5% gravel, fine. Gravel layer at ~25.2 and 25.3'.

Bottom of borehole at 28.0 feet.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
CLO = CHEMICAL LIKE ODOR
ALO = ASPHALT LIKE ODOR

CrLO= CREOSOTE LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
CiLO= CITRUS LIKE ODOR

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Site Id: RSB-01

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/30/02 - 09/30/02

Total Depth: 28.00'

Remarks: Samples selected for analysis at 2-4', 13-15' and 26-28'.

Elevation: 18.31'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0-2', Geoprobe 2-28'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm 0.0 ppm 0.0 ppm 65 ppm 170 ppm		Brown, sandy FILL w/some silt, loose, dry (composite) Brown, silty sandy FILL w/some brick and oyster shells Brown, PEAT, some fine-coarse sand, soft, plastic, petroleum-like odor Brown-gray, silty SAND, semi-compact, petroleum-like odor, wet at 5'
5		4-8'	32 ppm 33 ppm 25 ppm 26 ppm 6.0 ppm 4.0 ppm 7.0 ppm 0.0 ppm		Brown-gray, fine-coarse SAND w/some fine-coarse gravel, loose, dark brown NAPL staining from 7.75-8', petroleum-like odor to 7.5', slight naphthalene-like odor from 7.5-8', wet
10		8-12'	10 ppm 2.0 ppm 1.0 ppm 0.0 ppm 0.0 ppm		Gray-brown, fine gravelly fine-coarse SAND, trace coarse gravel, loose, gravel lens w/brown staining and slight naphthalene-like odor at 9', wet
15		12-16'	0.0 ppm 9.5 ppm 4.0 ppm 4.0 ppm 15 ppm		Brown, fine-coarse SAND w/fine and some coarse gravel, loose, moderate brown staining from 12-13', saturated w/NAPL from 14-14.5', slight naphthalene-like odor, wet
		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Orange brown, fine-coarse SAND, trace fine gravel, loose, NAPL staining on liner, wet
20		20-24'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine gravel, loose, NAPL staining at top of liner, sheen to 21.5', wet
25		24-28'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/trace fine gravel, loose, heavy staining on liner, wet
					Base of boring - 28 ft.

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Site Id: RSB-02

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 10/01/02 - 10/01/02

Total Depth: 28.00'

Remarks: Samples selected for analysis at 0-2', 10-12', 16-18' and 24-26'.

Elevation: 18.74'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Geoprobe

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm 0.0 ppm 0.0 ppm		Brown, silty FILL, some fine-coarse sand and gravel, concrete, glass, soft, moist
					Brown, silty sandy FILL, some fine-coarse gravel, glass
5		4-8'	0.0 ppm 40 ppm 33 ppm 61 ppm 102 ppm 75 ppm		Dark brown, PEAT, soft, plastic, naphthalene-like odor, moist Brown, fine-coarse SAND w/f-c gravel, heavy staining to saturated w/NAPL in coarse gravel w/f gravel from 5.5-6.5', heavy brown staining
10		8-12'	41 ppm 104 ppm 93 ppm 115 ppm 119 ppm 105 ppm 80 ppm		Brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, heavy brown staining, heavy naphthalene-like odor, wet
		12-16'	96 ppm 43 ppm 18 ppm 12 ppm 6.0 ppm 0.0 ppm 0.0 ppm		Orange brown, fine-coarse SAND w/some fine-coarse gravel, loose, lenses of heavy black staining at 13.5', 13.75', and 14.5', naphthalene-like odor, wet
15		16-20'	25 ppm 10 ppm 20 ppm 7.0 ppm 10 ppm		Light brown, fine-coarse SAND w/some fine-coarse gravel, loose, moderate-heavy black staining to 17', naphthalene-like odor, wet
20		20-24'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
25		24-28'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Dark brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
					Base of boring - 28 ft.

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Site Id: RSB-03

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/23/02 - 09/23/02

Total Depth: 20.00'

Elevation: 18.82'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Geoprobe

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Remarks: Samples selected for analysis at 2-4', 6-8' and 17-19'.
Post hole dug to 4'.

Depth (ft)	Sample Interval	PID	Material Description
0-4	0-4'	0.0 ppm	FILL, 6" of concrete Dark brown, silty FILL, fine gravel, vesicular slag, loose, non-plastic, soft, moist (composite)
4-8	4-8'	0.0 ppm 0.0 ppm 4.0 ppm 50 ppm 80 ppm 100 ppm 20 ppm 26 ppm	Brown, silty fine-medium SAND, some coarse sand, hard, moist Brown, PEAT, wood fibers, soft, plastic, moist-wet at 5.5' Dark brown-gray, fine-coarse SAND w/some fine-coarse gravel, loose, brown staining, naphthalene-like odor, wet
8-12	8-12'	90 ppm 60 ppm 66 ppm 50 ppm 20 ppm	Brown, fine-coarse SAND w/fine-coarse gravel, loose, moderate-heavy brown-dark brown staining, naphthalene-like odor, wet
12-16	12-16'	4.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine-coarse gravel, loose, brown staining, naphthalene-like odor, wet to brown, fine-coarse SAND w/some fine-coarse gravel, loose, slight naphthalene-like odor, slight sheen, wet
16-20	16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown-orange brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
20			Base of boring - 20 ft.

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- Site Id: RSB-04
- Location: Watchogue Creek
- Purpose: Soil Boring
- Date(s): 09/24/02 - 09/24/02
- Total Depth: 20.00'
- Remarks: Samples selected for analysis at 2-4', 5-7' and 12-14'.
- Elevation: 19.30'
- Datum: Mean Sea Level
- Logged By: John Schafer
- Drilling Method: Hand Augered 0-4', Geoprobe 4-20'
- Contractor: Zebra Environmental
- Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		FILL, 6" of concrete to dark brown, SILT w/some fine-coarse gravel and sand, soft to dark brown, fine-coarse SAND w/some fine gravel and silt, loose, moist (composite)
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 12 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, brown staining at 7' (0.5' wide), slight naphthalene-like odor, wet at 5.5'
10		8-12'	0.0 ppm 0.0 ppm 0.0 ppm 8.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/fine and some coarse gravel, loose, slight brown staining at 9.5', slight gravel interval at 10.5' with brown staining, slight naphthalene-like odor, wet
15		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Orange brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
20		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Orange brown-brown, fine-coarse SAND w/some fine and trace coarse gravel, slight gravel lens at 17', loose, wet
					Base of boring - 20 ft.
25					

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Site Id: RSB-05

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/24/02 - 09/24/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 2-4' and 5-7'.

Elevation: 18.66'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0-4', Geoprobe 4-20'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		Brown, silty fine-coarse SAND w/some fine gravel, loose, earthy odor, moist Brown, fine-coarse SAND w/some gravel, trace coarse gravel, loose, moist (composite)
5		4-8'	9.0 ppm 11 ppm 12 ppm 0.0 ppm 2.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, black staining at 6.5', possible creosote-like odor, wet at 5'
10		8-12'	1.7 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/some fine-coarse gravel, loose, black staining from 9-9.5', wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/some fine gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/some fine and coarse gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB–06	Location: Watchogue Creek
Elevation: 19.06'	Purpose: Soil Boring
Datum: Mean Sea Level	Date(s): 09/24/02 – 09/24/02
Logged By: John Schafer	Total Depth: 20.00'
Drilling Method: Hand Augered 0–4', Geoprobe 4–20'	Remarks: Samples selected for analysis at 4–5' and 5–7'.
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0–4'	0.0 ppm		Brown, silty fine–coarse SAND w/some fine gravel, loose, moist Brown, fine–coarse SAND w/some fine gravel, trace coarse gravel, loose, moist (composite)
5		4–8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine–coarse SAND w/fine–coarse gravel, loose, wet at 5.5'
10		8–12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Same as above, wet
		12–16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Same as above
15		16–20'	0.0 ppm 0.0 ppm		Light brown, fine–coarse SAND w/fine and some coarse gravel, loose, wet
20					Base of boring – 20 ft.
25					

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Elevation: 19.36'	Site Id: RSB-07
Datum: Mean Sea Level	Location: Watchogue Creek
Logged By: John Schafer	Purpose: Soil Boring
Drilling Method: Hand Augered 0-4', Geoprobe 4-20'	Date(s): 09/24/02 - 09/24/02
Contractor: Zebra Environmental	Total Depth: 20.00'
Borehole Dia.: 2.00in	Remarks: Samples selected for analysis at 4-5' and 6-8'.

Sample Interval	PID	Material Description
0-4'		Brown, sandy SILT, soft, non-plastic, dry Tan, fine-coarse SAND w/some fine-coarse gravel, loose, moist (composite)
4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine-coarse gravel, some silt from 4-5', compact-loose, black-silver staining at 7', slight naphthalene-like odor, wet at 5'
8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Light brown, fine-coarse SAND w/fine-coarse gravel, loose, wet
12-16	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Same as above
16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Light brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
		Base of boring - 20 ft.

Depth (ft): 5, 10, 15, 20, 25

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Site Id: RSB-08	Elevation: 19.64'
Location: Watchogue Creek	Datum: Mean Sea Level
Purpose: Soil Boring	Logged By: John Schafer
Date(s): 09/25/02 - 09/25/02	Drilling Method: Hand Augered 0-4', Geoprobe 4-20'
Total Depth: 20.00'	Contractor: Zebra Environmental
Remarks: Samples selected for analysis at 2-4' and 6-8'.	Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		Brown-light orange brown, silty SAND, fine-coarse sand w/some fine gravel, trace coarse gravel, loose, dry-moist (composite)
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light orange brown-brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, moist-wet at 5.5'
10		8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown-light brown, fine-coarse SAND w/some fine and trace coarse gravel, gravel lenses at 8.5' and 10.5', loose, wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND, trace fine-coarse gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB-08

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/25/02 - 09/25/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 2-4' and 6-8'.

Elevation: 19.64'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0-4', Geoprobe 4-20'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		Brown-light orange brown, silty SAND, fine-coarse sand w/some fine gravel, trace coarse gravel, loose, dry-moist (composite)
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light orange brown-brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, moist-wet at 5.5'
10		8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown-light brown, fine-coarse SAND w/some fine and trace coarse gravel, gravel lenses at 8.5' and 10.5', loose, wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND, trace fine-coarse gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB-09

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/30/02 – 09/30/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 2–4', 8–10' and 16–18'.

Elevation: 19.72'

Datum: Mean Sea level

Logged By: John Schafer

Drilling Method: Hand Augered 0–4', Geoprobe 4–20'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0–4'	189 ppm		Black, silty FILL, 4" of concrete at top, coal, brick, glass, possible black staining, petroleum–like odor
			241 ppm		Brown, silty fine–coarse SAND w/some fine–coarse gravel, dense, heavy petroleum–like odor, wet (composite)
5		4–8'	750 ppm 400 ppm 420 ppm 440 ppm 500 ppm 600 ppm 460 ppm		Brown, fine–coarse SAND w/some fine–coarse gravel, loose, black staining at 4.5' and 7.5', heavy petroleum–like odor, wet
10		8–12'	600 ppm 675 ppm 350 ppm 410 ppm 250 ppm 150 ppm 95 ppm 200 ppm		Lt brown–orange brown, fine–coarse SAND w/fine and some coarse gravel, loose, black staining from 8–9.5', heavy petroleum–like odor, wet
15		12–16'	6.0 ppm 1.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine–coarse SAND w/some fine and trace coarse gravel, loose, slight petroleum–like odor from 12–12.5', wet
		16–20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine–coarse SAND w/fine and some coarse gravel, loose, wet
20					Base of boring – 20 ft.
25					

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Site Id: RSB-10

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/26/02 – 09/26/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 0–4', 8–12' and 16–20'.

Elevation: 19.72'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0–4', Geoprobe 4–20'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0–4'	0.0 ppm		Brown, silty fine–coarse SAND w/some fine–coarse gravel, loose, dry–moist (composite)
5		4–8'	0.0 ppm 0.0 ppm 32 ppm 290 ppm 144 ppm 248 ppm		Brown–gray, fine–coarse SAND w/some fine–coarse gravel, silt to 6', compact–loose, petroleum–like odor, wet at 5'
10		8–12'	511 ppm 441 ppm 311 ppm 45 ppm 40 ppm		Light brown, fine–coarse SAND w/fine to coarse gravel, loose, heavy petroleum–like odor, wet
15		12–16'	0.0 ppm 0.0 ppm 4.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown–orange brown, fine–coarse SAND w/fine–coarse gravel, coarse gravel lens at 14.75'
20		16–20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine–coarse SAND w/some fine and trace coarse gravel, loose, wet
					Base of boring – 20 ft.
25					

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Site Id: RSB-11

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 10/02/02 - 10/02/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 2-4', 6-8 and 16-18'.

Elevation: 19.98'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0-4', Geoprobe 4-20'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		Brown, silty FILL, glass, coal, brick, roots, soft, non-plastic, dry (composite)
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 230 ppm 630 ppm 1833 ppm		Brown, sandy SILT w/some fine-coarse sand and gravel, soft, slightly plastic, moist-wet at 6' Brown, fine-coarse SAND w/fine-coarse gravel, loose, black staining from 7-8', strong petroleum-like odor, wet
10		8-12'	10 ppm 10 ppm 10 ppm 5.0 ppm 15 ppm 3.0 ppm 3.0 ppm		Brown, fine-coarse SAND w/fine-coarse gravel, loose, slight naphthalene-like odor, wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB-12	
Location: Watchogue Creek	
Purpose: Soil Boring	
Date(s): 10/01/02 – 10/01/02	
Total Depth: 20.00'	
Elevation: 20.56'	Remarks: Samples selected for analysis at 2-4', 8-10' and 16-18'.
Datum: Mean Sea Level	
Logged By: John Schafer	
Drilling Method: Hand Augered 0-4', Geoprobe 4-20'	
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		Brown, fine-coarse sandy fine-coarse GRAVEL, loose, dry (composite)
			0.0 ppm		Brown, SILT matrix w/sand, some gravel, some roots, loose, dry
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/fine-coarse gravel, some silt, compact, moist-wet at 6'
10		8-12'	0.0 ppm 0.0 ppm 0.5 ppm 5.5 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/fine gravel, loose, wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/fine-coarse gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
20					Base of boring – 20 ft.
25					

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Elevation: 19.75'	Site Id: RSB-13
Datum: Mean Sea Level	Location: Watchogue Creek
Logged By: John Schafer	Purpose: Soil Boring
Drilling Method: Hand Augered 0-4', Geoprobe 4-20'	Date(s): 09/26/02 - 09/26/02
Contractor: Zebra Environmental	Total Depth: 20.00'
Borehole Dia.: 2.00in	Remarks: Samples selected for analysis at 0-4', 8-12' and 16-20'.

Depth (ft)	Sample Interval	PID	Material Description
0	0-4'	0.0 ppm	Brown, SILT, soft, dry, non-plastic
			Brown, silty fine-coarse SAND w/some fine-coarse gravel, loose, dry-moist (composite)
5	4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Orange brown-brown, fine-coarse SAND w/some fine-coarse gravel, loose, possible dark brown staining and slight petroleum-like odor from 7-7.5', wet at 6'
10	8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/some fine-coarse gravel, loose, black staining from 10-11', possible slight petroleum-like odor from 10-11', wet
	12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
15	16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/some fine and coarse gravel, loose, wet
20			Base of boring - 20 ft.
25			

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Site Id: RSB-14	
Location: Watchogue Creek	
Purpose: Soil Boring	
Date(s): 09/27/02 - 09/27/02	
Total Depth: 28.00'	
Elevation: 19.44'	Remarks: Samples selected for analysis at 0-4', 8-10', 16-18' and 22-24'.
Datum: Mean Sea Level	
Logged By: John Schafer	
Drilling Method: Hand Augered 0-4', Geoprobe 4-28'	
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm		Brown, SILT w/some fine and coarse gravel, root material, loose, soft, non-plastic, dry (composite)
5		4-8'	0.0 ppm 0.0 ppm 29 ppm 48 ppm 72 ppm 144 ppm		Brown, SILT, some f-c sand and gravel, slightly plastic, roots, moist to PEAT, soft, plastic, naphthalene-like odor, moist-wet at 5.5' Brown, sandy GRAVEL, loose, heavy staining to almost saturated w/NAPL, naphthalene-like odor, wet
10		8-12'	160 ppm 67 ppm 102 ppm 83 ppm 53 ppm 48 ppm 42 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, heavy brown staining, heavy naphthalene-like odor, wet
		12-16'	15 ppm 18 ppm 12 ppm 12 ppm 17 ppm		Black/brown fine-coarse SAND w/some fine gravel, slight gravel lenses from 12-12.3', loose, heavy black/brown staining, naphthalene-like odor, wet
15		16-20'	5.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 17 ppm		Brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, lenses of black NAPL at 16.5' and from 18-18.5', slight naphthalene-like odor, wet
20		20-24'	6.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Reddish brown, fine-coarse SAND w/some fine gravel, loose, slight naphthalene-like odor at 20.5', wet
25		24-28'	0.0 ppm 0.0 ppm		Orange brown, fine-medium SAND, slightly dense, wet
					Base of boring - 28 ft.

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Site Id: RSB-15	
Location: Watchogue Creek	
Purpose: Soil Boring	
Date(s): 09/27/02 - 09/27/02	
Total Depth: 28.00'	
Elevation: 19.35'	Remarks: Samples selected for analysis at 0-4', 4-8', 16-18' and 20-24'.
Datum: Mean Sea Level	
Logged By: John Schafer	
Drilling Method: Hand Augered 0-4', Geoprobe 4-28'	
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'			Brown, SILT w/some fine-coarse sand, fine-coarse gravel, 4" of concrete at top, soft, non-plastic, dry (composite)
5		4-8'	0.0 ppm 0.0 ppm 14 ppm 55 ppm 150 ppm 210 ppm 140 ppm		Dk brown, PEAT, soft, plastic, moist to brown-gray, silty f-c SAND w/some fine and trace coarse gravel, compact, slight petroleum-like odor, moist-wet at 5.5' Brown, f gravelly fine-coarse sand, loose, heavy petroleum-like odor, wet Brown, fine-coarse SAND, trace f gravel, loose, petroleum-like odor, wet
10		8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
		12-16'	6.5 ppm 0.0 ppm 0.0 ppm 0.0 ppm 9.0 ppm 2.0 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, brown staining at 12' in a slightly coarser zone, coarser sand and gravel lens saturated w/black NAPL at 14', mod brown staining from 14.25-15', slight naphthalene-like odor at 12' and from 14-15', wet
15		16-20'	20 ppm 17 ppm 6.0 ppm 5.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/fine-coarse gravel, loose, heavy brown-black staining to NAPL saturated from 16-17', slight staining with sheen, naphthalene-like odor, wet
20		20-24'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND, trace fine gravel, loose, wet
25		24-28'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
					Base of boring - 28 ft.

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Site Id: RSB-16	
Location: Watchogue Creek	
Purpose: Soil Boring	
Date(s): 09/26/02 - 09/26/02	
Total Depth: 24.00'	
Elevation: 20.06'	Remarks: Samples selected for analysis at 0-4', 8-12', 14-15' and 16-20'.
Datum: Mean Sea Level	
Logged By: John Schafer	
Drilling Method: Hand Augered 0-4', Geoprobe 4-24'	
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Sample Interval	PID
0–4	0–4'	0.0 ppm
4–8	4–8'	0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm, 46 ppm, 190 ppm
8–12	8–12'	90 ppm, 200 ppm, 200 ppm, 55 ppm, 30 ppm, 32 ppm, 24 ppm, 18 ppm
12–16	12–16'	3.0 ppm, 4.0 ppm, 2.0 ppm, 2.5 ppm, 4.5 ppm, 50 ppm
16–20	16–20	0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm
20–24	20–24'	0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm, 0.0 ppm

Material Description

Brown, SILT w/fine-coarse gravel, soft, non-plastic, some root material, dry (composite)

Brown, SILT, soft, non-plastic, dry

Brown, silty fine-medium SAND w/some fine gravel, loose, dry

Dark brown, PEAT, soft, plastic, petroleum-like odor, moist

Gray, sandy SILT, soft, plastic, petroleum-like odor, wet

Brown, SAND w/some fine-coarse gravel, some silt to 9', loose, petroleum-like odor, wet

Brown, SAND w/some fine-coarse gravel, fine gravel lens from 14.75-15', loose, heavy staining to saturated with NAPL from 14.5-15', petroleum-like odor to 14', naphthalene-like odor from 14.5-15', wet

Brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet

Same as above

Base of boring - 24 ft.

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Site Id: RSB-17	Location: Watchogue Creek
Elevation: 19.06'	Purpose: Soil Boring
Datum: Mean Sea Level	Date(s): 09/25/02 - 09/25/02
Logged By: John Schafer	Total Depth: 20.00'
Drilling Method: Hand Augered 0-4', Geoprobe 4-20'	Remarks: Samples selected for analysis at 0-4' and 8-12'.
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'			Brown, SILT w/some sand, 1" of asphalt at top, soft, slightly plastic, moist (composite)
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/fine gravel, trace coarse gravel, loose, moist-wet at 5.5'
10		8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/fine and some coarse gravel, gravel lenses at 8' and 10', loose, wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/fine and some coarse gravel, loose, natural dark brown discoloration at 13', wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine gravel and trace coarse gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB-18

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/25/02 - 09/25/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 0-4' and 8-12'.

Elevation: 17.96'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0-4', Geoprobe 4-20'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'			Orange brown, fine-coarse SAND, 1" of asphalt at top, loose, moist
					Brown, PEAT, soft, plastic, roots
					Light brown, clayey SILT w/some fine sand, wet (composite)
5		4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Dark brown-gray, fine-coarse SAND, some silt to 5', fine and some coarse gravel, loose, wet
10		8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
15		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Dark brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Same as above
20					Base of boring - 20 ft.
25					

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Site Id: RSB-19

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 09/25/02 - 09/25/02

Total Depth: 20.00'

Remarks: Samples selected for analysis at 1-3' and 16-18'.

Elevation: 14.90'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Geoprobe

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm 60 ppm 80 ppm 174 ppm 120 ppm 60 ppm		FILL, 6" of brick fragments in a gravelly matrix Black, sandy fine GRAVEL w/some coarse gravel, loose, heavy staining to saturated with NAPL, naphthalene-like odor
5		4-8'	57 ppm 101 ppm 60 ppm 60 ppm 55 ppm 35 ppm 36 ppm 20 ppm		Brown fine gravelly fine-coarse SAND, loose, brown staining, naphthalene-like odor, sheen, wet
10		8-12'	0.0 ppm 1.0 ppm 20 ppm 10 ppm 0.0 ppm		Brown-light orange brown, fine-coarse SAND w/some fine-coarse gravel, gravel lens at 10', loose, lens of black staining at 8', 8.5', 9' and 10', sheen, wet
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/some fine gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB-20	
Location: Watchogue Creek	
Purpose: Soil Boring	
Date(s): 10/01/02 - 10/01/02	
Total Depth: 20.00'	
Elevation: 19.65'	Remarks: Samples selected for analysis at 0-2', 6-8' and 16-18'.
Datum: Mean Sea Level	
Logged By: John Schafer	
Drilling Method: Geoprobe	
Contractor: Zebra Environmental	
Borehole Dia.: 2.00in	

Depth (ft)	Recovery	Sample Interval	PID	Graphic Log	Material Description
		0-4'	0.0 ppm 0.0 ppm 0.0 ppm		Brown, silty FILL, some vesicular slag, wood, glass, concrete, soft, dry Brown, silty fine-coarse SAND w/some fine-coarse gravel, compact, moist
5		4-8'	0.0 ppm 0.0 ppm 12 ppm 160 ppm 261 ppm 500 ppm		Light brown, fine-coarse SAND w/fine-coarse gravel, loose, light black staining from 5.75-6' and 6.75-7', heavy petroleum-like odor, wet at 6'
10		8-12'	112 ppm 10 ppm 4.0 ppm 4.0 ppm 15 ppm 6.0 ppm		Brown, fine-coarse SAND w/fine-coarse gravel, loose, light black staining from 8-8.5', petroleum-like odor, wet
		12-16'	0.5 ppm 0.3 ppm 0.0 ppm 0.0 ppm		Brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm		Light brown, fine-coarse SAND w/trace fine gravel, loose, wet
20					Base of boring - 20 ft.
25					

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Site Id: RSB-21

Location: Watchogue Creek

Purpose: Soil Boring

Date(s): 10/02/02 - 10/02/02

Total Depth: 28.00'

Remarks: Samples selected for analysis at 2-4', 4-6', 8-10' and 24-26'.

Elevation: 19.58'

Datum: Mean Sea Level

Logged By: John Schafer

Drilling Method: Hand Augered 0-4', Geoprobe 4-28'

Contractor: Zebra Environmental

Borehole Dia.: 2.00in

Sample Interval	PID	Material Description
0-4'	0.0 ppm	Brown, silty FILL, gravel, clay, 8" of concrete at top, some glass, brick (composite)
4-8'	0.0 ppm 65 ppm 31 ppm 10 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine-coarse gravel, dark brown peat from 4.5-5', brown sandy gravel from 6.5-7', loose, slight petroleum-like odor, wet at 5'
8-12'	0.0 ppm 5.0 ppm 52 ppm 47 ppm 56 ppm	Black, fine-coarse SAND w/some fine and trace coarse gravel, loose, black staining, heavy-moderate dark brown staining from 9-10.5', naphthalene-like odor, wet
12-16'	50 ppm 45 ppm 0.0 ppm 0.0 ppm 10 ppm	Brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, heavy NAPL staining from 12-12.25', saturated with NAPL from 14.25-14.5', slight naphthalene-like odor, wet
16-20'	0.0 ppm 2.0 ppm 4.0 ppm 5.0 ppm	Brown, fine-coarse SAND w/some fine and coarse gravel, loose, brown-black staining to saturated w/NAPL at 16.5' and from 17-17.5', slight naphthalene-like odor, wet
20-24'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Orange-brown, fine-coarse SAND w/some fine gravel and trace coarse gravel, loose, wet
24-28'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Orange-brown, fine-coarse SAND w/some fine gravel, loose, wet
		Base of boring - 28 ft.

Depth (ft): 5, 10, 15, 20, 25

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Site Id: RMW-01

Date(s): 10/01/02 - 10/01/02

Datum: Mean Sea Level

Elevation: 18.83' | Measuring Point: 20.00'

Completed Depth: 14.50' | Total Depth: 28.00'

Screens:
type: Slotted size: 0.010in dia: 1.00in fm: 4.50' to: 14.50'

Location: Watchogue Creek

Purpose: Monitoring Well, Shallow

Logged By: John Schafer

Drilling Method: Geoprobe

Borehole Dia.: 2.00in

Contractor: Zebra Environmental

Remarks: Logged from boring RSB-21.

Sample Interval	Vapor	Material Description
0-4'	0.0 ppm	Brown, silty FILL, gravel, clay, 8" of concrete at top, some glass, brick (composite)
4-8'	0.0 ppm 65 ppm 31 ppm 10 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine-coarse gravel, dark brown peat from 4.5-5', brown sandy gravel from 6.5-7', loose, slight petroleum-like odor, wet at 5'
8-12'	0.0 ppm 5.0 ppm 52 ppm 47 ppm 56 ppm	Black, fine-coarse SAND w/some fine and trace coarse gravel, loose, black staining, heavy-moderate dark brown staining from 9-10.5', naphthalene-like odor, wet
12-16'	50 ppm 45 ppm 0.0 ppm 0.0 ppm 10 ppm	Brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, heavy NAPL staining from 12-12.25', saturated with NAPL from 14.25-14.5', slight naphthalene-like odor, wet
16-20'	0.0 ppm 2.0 ppm 4.0 ppm 5.0 ppm	Brown, fine-coarse SAND w/some fine and coarse gravel, loose, brown-black staining to saturated w/NAPL at 16.5' and from 17-17.5', slight naphthalene-like odor, wet
20-24'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Orange-brown, fine-coarse SAND w/some fine gravel and trace coarse gravel, loose, wet
24-28'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Orange-brown, fine-coarse SAND w/some fine gravel, loose, wet
		Base of boring - 20 ft.

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Site Id: RMW-02	
Date(s): 09/26/02 - 09/26/02	
Datum: Mean Sea Level	
Elevation: 19.80'	Measuring Point: 20.23'
Completed Depth: 15.00'	Total Depth: 20.00'

Screens:
type: Slotted size: 0.010in dia: 1.00in fm: 5.00' to: 15.00'

Remarks: Logged from boring RSB-10.

Location: Watchogue Creek

Purpose: Monitoring Well, Shallow

Logged By: John Schafer

Drilling Method: Geoprobe

Borehole Dia.: 2.00in

Contractor: Zebra Environmental

Depth (ft)	Recovery	Sample Interval	Vapor	Material Description	Graphic Log	Screen Zones
		0-4'	0.0 ppm	Brown, silty fine-coarse SAND w/some fine-coarse gravel, loose, dry-moist (composite)		
5		4-8'	0.0 ppm 0.0 ppm 32 ppm 290 ppm 144 ppm 248 ppm	Brown-gray, fine-coarse SAND w/some fine-coarse gravel, silt to 6', compact-loose, petroleum-like odor, wet at 5'		
10		8-12'	511 ppm 441 ppm 311 ppm 45 ppm 40 ppm	Light brown, fine-coarse SAND w/fine to coarse gravel, loose, heavy petroleum-like odor, wet		
		12-16'	0.0 ppm 0.0 ppm 4.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Light brown-orange brown, fine-coarse SAND w/fine-coarse gravel, coarse gravel lens at 14.75'		
15		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Light brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, wet		
20				Base of boring - 20 ft.		
25						

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Site Id: RMW-03

Date(s): 09/26/02 - 09/26/02

Datum: Mean Sea Level

Elevation: 19.76' | Measuring Point: 19.74'

Completed Depth: 15.00' | Total Depth: 20.00'

Location: Watchogue Creek

Purpose: Monitoring Well, Shallow

Logged By: John Schafer

Drilling Method: Geoprobe

Borehole Dia.: 2.00in

Contractor: Zebra Environmental

Screens:
type: Slotted size: 0.010in dia: 1.00in fm: 5.00' to: 15.00'

Remarks: Logged from boring RSB-13.

Depth (ft)	Sample Interval	Vapor	Material Description
	0-4'		Brown, SILT, soft, dry, non-plastic
		0.0 ppm	Brown, silty fine-coarse SAND w/some fine-coarse gravel, loose, dry-moist (composite)
5	4-8'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Orange brown-brown, fine-coarse SAND w/some fine-coarse gravel, loose, possible dark brown staining and slight petroleum-like odor from 7-7.5', wet at 6'
10	8-12'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/some fine-coarse gravel, loose, black staining from 10-11', possible slight petroleum-like odor from 10-11', wet
	12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
15	16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/some fine and coarse gravel, loose, wet
20			Base of boring - 20 ft.
25			

Recovery | Graphic Log | Screen Zones

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Site Id: RMW-04

Date(s): 09/30/02 - 09/30/02

Datum: Mean Sea Level

Elevation: 19.65' | Measuring Point: 19.62'

Completed Depth: 14.50' | Total Depth: 20.00'

Location: Watchogue Creek

Purpose: Monitoring Well, Shallow

Logged By: John Schafer

Drilling Method: Geoprobe

Borehole Dia.: 2.00in

Contractor: Zebra Environmental

Screens:
type: Slotted size: 0.010in dia: 1.00in fm: 4.50' to: 14.50'

Remarks: Logged from boring RSB-09.

Sample Interval	Vapor	Material Description
0–4'	189 ppm	Black, silty FILL, 4" of concrete at top, coal, brick, glass, possible black staining, petroleum-like odor
	241 ppm	Brown, silty fine-coarse SAND w/some fine-coarse gravel, dense, heavy petroleum-like odor, wet (composite)
4–8'	750 ppm 400 ppm	
	420 ppm 440 ppm 500 ppm 600 ppm 460 ppm	Brown, fine-coarse SAND w/some fine-coarse gravel, loose, black staining at 4.5' and 7.5', heavy petroleum-like odor, wet
8–12'	600 ppm 675 ppm 350 ppm 410 ppm 250 ppm 150 ppm 95 ppm 200 ppm	Lt brown-orange brown, fine-coarse SAND w/fine and some coarse gravel, loose, black staining from 8-9.5', heavy petroleum-like odor, wet
12–16'	6.0 ppm 1.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/some fine and trace coarse gravel, loose, slight petroleum-like odor from 12-12.5', wet
16–20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine and some coarse gravel, loose, wet
		Base of boring - 20 ft.

Depth (ft) | Recovery | Graphic Log | Screen Zones

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Site Id: RMW-05

Date(s): 10/01/02 - 10/01/02

Datum: Mean Sea Level

Elevation: 20.59'	Measuring Point: 20.83'
Completed Depth: 15.00'	Total Depth: 20.00'

Location: Watchogue Creek

Purpose: Monitoring Well, Shallow

Logged By: John Schafer

Drilling Method: Geoprobe

Borehole Dia.: 2.00in

Contractor: Zebra Environmental

Screens:
type: Slotted size: 0.010in dia: 1.00in fm: 5.00' to: 15.00'

Remarks: Logged from boring RSB-12.

Depth (ft)	Recovery	Sample Interval	Vapor	Material Description	Graphic Log	Screen Zones
		0-4'	0.0 ppm	Brown, fine-coarse sandy fine-coarse GRAVEL, loose, dry (composite)		
			0.0 ppm			
		4-8'	0.0 ppm	Brown, SILT matrix w/sand, some gravel, some roots, loose, dry		
5			0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine-coarse gravel, some silt, compact, moist-wet at 6'		
		8-12'	0.0 ppm 0.0 ppm 0.5 ppm 5.5 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/fine gravel, loose, wet		
10						
		12-16'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Light brown, fine-coarse SAND w/fine-coarse gravel, loose, wet		
15						
		16-20'	0.0 ppm 0.0 ppm 0.0 ppm 0.0 ppm	Brown, fine-coarse SAND w/some fine-coarse gravel, loose, wet		
20				Base of boring - 20 ft.		
25						

Site Id: RSB-22

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 03/31/03	Date Completed: 03/31/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 19.95'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 20.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		80	0 ppm		0-0.8: Dark brown, moderately well sorted SILT to FINE SAND (topsoil), trace medium sand to pebbles, trace roots, dry, loose					
					0.8-3.5: Medium brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, trace pebbles, medium dense					
4-8		80	0 ppm		3.5-8: Light brown to reddish brown, moderately well sorted MEDIUM SAND, some coarse sand, trace pebbles, medium dense, water saturated @ 6.0' bgs	6-8				
8-12		80	0 ppm	10	8-16: Light brown with trace rust red oxidation banding (<1 cm thickness), moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand interstratified with layers (1-6 cm thickness) of moderately poorly sorted, coarse sand to pebbles, some medium sand, trace fine sand, medium dense					10
12-16		70	0 ppm							

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-22

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 03/31/03	Date Completed: 03/31/03
Ground Elevation: 19.95'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 20.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80	0 ppm	20	16-20: Light brown MEDIUM SAND, some coarse sand, trace pebbles, trace fine sand, medium dense	16-20				0 -10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-23

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.96'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 20.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		80	0 ppm		0-2.6: Blackish brown sand to pebble-sized BRICK FRAGMENTS and BOTTOM ASH, trace coal fragments, trace fine sand to silt, dry, medium dense					
			0 ppm		2.6-4: Dark brown, moderately well sorted FINE SAND, some silt, trace clay, moist, dense					
4-8		70	0 ppm		4-4.6: Brownish gray, moderately well sorted MEDIUM to COARSE SAND, trace pebbles, trace fine sand					
			0 ppm		4.6-5.3: Brownish gray, moderately poorly sorted MEDIUM to COARSE SAND, little pebbles, moist, medium dense					
			0 ppm		5.3-5.6: Reddish brown, moderately well sorted FINE to MEDIUM SAND, trace fine sand, medium dense					
			0 ppm		5.6-8: Brownish gray, moderately poorly sorted MEDIUM to COARSE SAND, little pebbles, moist, medium dense, water saturated @ 6.0' bgs	6-8				
8-12		70	0 ppm		8-8.4: Light brown, moderately well sorted MEDIUM SAND, little coarse sand, trace pebbles, trace fine sand, medium dense					
			0 ppm		8.4-8.8: Light brown, moderately poorly sorted MEDIUM to COARSE SAND, little pebbles, trace fine sand, medium dense					
			0 ppm	10	8.8-16: Light brown, moderately well sorted MEDIUM SAND, little coarse sand, trace pebbles, trace fine sand, trace dark red oxidation banding from 12-16 ft, medium dense					10
12-16		70	0 ppm							

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-23

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters

Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.96'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 20.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80			16-20: Light brown, moderately well sorted MEDIUM SAND, little coarse sand, trace pebbles, trace fine sand, medium dense	16-20				
				20						0
										-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-24

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 04/01/03	Date Completed: 04/01/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 19.47'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 20.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		70	0 ppm		0-0.3: CONCRETE 0.3-0.5: Black gravel to sand-sixed COAL FRAGMENTS 0.5-4: Medium brown, moderately well sorted SILT to FINE SAND, little medium sand, trace coarse sand to pebbles, moist, dense					
4-8		70	0 ppm		4-7.2: Yellowish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace pebbles, trace fine sand water saturated @ 6.0 bgs					
			0 ppm		7.2-10.2: Yellowish brown, very well sorted MEDIUM SAND, trace coarse sand, medium dense	6-8				
8-12		70								10
			0 ppm	10	10.2-10.4: Reddish brown, moderately well sorted MEDIUM SAND, some coarse sand, trace pebbles, trace fine sand, medium dense					
			0 ppm		10.4-12: Yellowish brown, very well sorted MEDIUM SAND, trace coarse sand, medium dense					
12-16		60			12-20: Interstratified layers (2-3 cm thickness) of 1) Yellowish brown, very well sorted MEDIUM SAND, trace coarse sand, medium dense and 2) Reddish brown, moderately well sorted MEDIUM SAND, some coarse sand, trace pebbles, trace fine sand, medium dense					

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-24

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters

Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.47'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 20.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		70				16-20				
				20						0
										-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-25

GEI Consultants, Inc.

Client: Keyspan Energy Corp.

Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 18.86'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		70	0 ppm		0-4: Grayish brown, moderately well sorted MEDIUM SAND, trace fine sand, trace coarse sand, trace pebbles, moist					
4-8		75	0 ppm		4-5.8: Yellowish brown to reddish brown moderately poorly sorted, MEDIUM SAND, some coarse sand, trace pebbles trace fine sand, water saturated @ 5.5' bgs					
			0 ppm		5.8-10.4: Grayish brown, MEDIUM SAND, some coarse sand, trace pebbles to gravel, trace fine sand, very faint fuel oil-like odor	6-8			very faint fuel oil-like odor	
8-12		90	0 ppm							10
			0 ppm	10	10.4-12: Yellowish brown MEDIUM SAND, some coarse sand, trace pebbles to gravel, trace fine sand, no odor	8-12				
12-16		80	0 ppm		12-16: Yellowish brown, moderately poorly sorted, MEDIUM to COARSE SAND, some pebbles, trace fine sand					

Legend: Physical Observations

None

Sheen

Stain

Heavy

Site Id: RSB-25

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 04/02/03	Date Completed: 04/02/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 18.86'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 28.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		90	0 ppm		16-20: Interstratified layers of 1) Reddish brown, moderately poorly sorted MEDIUM to COARSE SAND, some pebbles, trace fine sand and 2) Reddish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, trace fine sand	16-20				0
20-24		80	0 ppm	20	20-28: Reddish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand trace pebbles					
24-28		70	0 ppm			24-28				-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-26

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.78'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		80	10-40 ppm 50-490 ppm		0-0.3: CONCRETE 0.3-0.7: Black sand to gravel-sized COAL FRAGMENTS and BOTTOM ASH, loose, moderate fuel oil-like odor 0.7-4: Olive gray to brown, moderately well sorted FINE SAND, little coarse sand, trace silt, trace pebbles, strong fuel oil-like odor	2-4			moderate fuel oil-like odor strong fuel oil-like odor	
4-8		80	100-320 ppm		4-7.8: Black-gray, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, trace pebbles with layers of dark blackish-gray petroleum staining from 5-5.6' and other 1-3 cm stained layers throughout interval, strong fuel oil-like odor	4-8			strong fuel oil-like odor	
8-12		90	0 ppm	10	7.8-12: Yellowish brown, moderately well sorted MEDIUM SAND, little fine sand, trace coarse sand to pebbles, very faint fuel oil-like odor, no staining	10-12			very faint fuel oil-like odor	10
12-16		70	0 ppm		12-16: Yellowish brown, moderately well sorted MEDIUM SAND, little fine sand, trace coarse sand to pebbles, very faint fuel-oil like odor					

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-26

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.78'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		70	0 ppm		16-22.4: Yellowish brown, moderately well sorted MEDIUM SAND, little fine sand, trace coarse sand to pebbles, very faint fuel oil-like odor				very faint fuel-oil like odor	
20-24		85	0 ppm	20	22.4-24: Reddish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, medium dense, no odor					0
24-28		90	0 ppm		24-28: Interstratified layers (0.4-0.7' thickness) of 1) Yellowish brown, moderately well sorted MEDIUM SAND, little fine sand, trace coarse sand to pebbles and 2) Reddish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, medium dense	24-28				-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-27

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/03/03	Date Completed: 04/03/03
Ground Elevation: 19.74'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		80	1-6 ppm		0-0.3: CONCRETE 0.3-4: Dark borwn, moderately well sorted FINE SAND, trace silt, moist, medium dense, moderate fuel oil-like odor	2-4			moderate fuel oil-like odor	
4-8		80	0 ppm		4-10.2: Gray, moderately well sorted MEDIUM to COARSE SAND, trace fine sand, trace pebbles water saturated @ 5.5' bgs no fuel oil-like odor, faint methane odor	6-8			faint methane odor	
8-12		80		10						10
			0 ppm		10.2-12: Yellowish brown, MEDIUM SAND, some coarse sand, trace pebbles, trace fine sand, no odor					
12-16		90	0 ppm		12-28: Interstratified layers (0.2 - 0.6' thick) of 1) Yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand; and 2) moderately poorly sorted MEDIUM SAND, some coarse sand, trace pebbles	12-16				

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-27

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 04/03/03	Date Completed: 04/03/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 19.74'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 28.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		60	0 ppm							
					See Description of 12-28' interval on page 1					
20-24		80	0 ppm	20						0
24-28		80	0 ppm			24-28				
										-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-28

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/03/03	Date Completed: 04/03/03
Ground Elevation: 19.86'	Datum: Ground Surface
Contractor: Zebra Environmental	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Odors	Elevation (ft)
0-4		30	0 ppm		0-0.2: CONCRETE 0.2-0.4: Bluestone GRAVEL 0.4-3.7: Reddish brown, FINE to MEDIUM SAND, some coarse sand to pebbles, trace fine sand, trace coal and bottom ash fragments, loose, dry			
4-8		65	50-220 ppm		3.7-6.7: Grayish brown, MEDIUM SAND, little coarse sand, trace pebbles, water saturated @ 5.5' bgs very strong fuel oil-like odor		very strong fuel oil-like odor	
			150-360 ppm		6.7-8: Black stained, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, very strong fuel oil-like odor	6-8	very strong fuel oil-like odor	
8-12		60	2-4 ppm		8-9.9: Medium brown, moderately well sorted FINE to MEDIUM SAND, faint fuel oil-like odor, no staining		faint fuel oil-like odor	
			4-5 ppm		9.9-10.1: Moderately well sorted COARSE SAND to PEBBLES, pore spaces saturated with seperate-phase tar and water			
				10	10.1-14.7: Medium brown, moderately well sorted FINE to MEDIUM SAND, moderate mixed fuel oil-like and tar-like odor	9.9-10.9	moderate fuel oil-like and tar-like odor	10
12-16		70	2-5 ppm					
			2-4 ppm		14.7-14.8: Moderately well sorted MEDIUM SAND, trace coarse sand, trace fine sand, soil grains coated with tar, 50-70% of pore space contained tar blebs			

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-28

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 04/03/03	Date Completed: 04/03/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 19.86'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 28.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80	0 ppm		14.8-17.7: Interstratified layers (0.2-0.6' thick) of 1) yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand trace fine sand; and 2) moderately poorly sorted MEDIUM SAND, some coarse sand, trace pebbles, very faint naphthalene-like odor, no tar				very faint naphthalene like odor	
					17.7-28: Reddish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand to pebbles, medium dense with some interstratified layers (0.2-0.6' thick) of reddish brown, medium to coarse sand, little pebbles, no odor	18-20				
20-24		70	0 ppm	20						0
24-28		70	0 ppm			24-28				
										-10

Legend: Physical Observations

None	Sheen
Stain	Heavy

Site Id: RSB-29

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.73'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		85	0 ppm		0-1.3: Dark brown, moderaely poorly sorted FINE to MEDIUM SAND, little coarse sand to pebble-sized brick fragments, trace coarse-grained coal and bottom ash, loose	0-4				
			50-85 ppm		1.3-4: Grayish brown, moderately well sorted FINE SAND, little silt, trace medium to coarse sand, moist, medium dense, strong fuel oil-like odor				strong fuel oil-like odor	
4-8		85	30-55 ppm		4-7.5: Grayish brown, moderately well sorted FINE SAND to SILT, little coarse sand to pebbles, trace clay (cohesive & sticky) stiff, moderate fuel oil-like odor, water saturated @ 5.5' bgs	6-8			moderate fuel oil-like odor	
8-12		95	80-150 ppm		7.5-9: Grayish, black-stained COASE SAND to PEBBLES, strong solvent-like odor mixed with fuel oil-like odor (impacts similar to RSB-31 (7.2-7.7'))				strong solvent-like odor and fuel oil-like odor	
			5-15 ppm	10	9-11.9: Grayish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand with some 3-4 cm interstratified layers of well sorted fine sand, trace medium to coarse sand, faint fuel oil-like odor mixed with methane-like odor	9-12			fuel oil-like odor with methane like odor	10
12-16		90	0 ppm		11.9-16: Yellowish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand, trace pebbles, no odor					

Legend: Physical Observations — None; Sheen; Stain; Heavy

Site Id: RSB-29

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/01/03	Date Completed: 04/01/03
Ground Elevation: 19.73'	Datum: Ground Surface
Contractor: Zebra Environmental	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		50	0 ppm		16-23.8: Interstratified layers of 1) yellowish brown MEDIUM to COARSE SAND, little pebbles, trace fine sand (0.2-0.5' thick) and 2) moderately well sorted FINE SAND, little medium sand, trace coarse sand, no odor	16-20				
20-24		50		20						0
24-28		50	0 ppm		23.8-28: Yellowish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand, medium dense					-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-30

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 19.75'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 32.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		30	0 ppm		0-5.9: Medium brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand, trace silt, loose					
4-8		30								
			200-300 ppm		5.9-8: Medium brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand, trace silt, loose, water saturated @ 6.0' bgs, strong fuel oil-like odor, moderate irridescent sheen	6-8			strong fuel oil-like odor	
8-12		60	1-4 ppm		8-11.8: Dark grayish brown, moderately well sorted MEDIUM SAND, trace coarse sand, trace pebbles w/some 1-3 cm lenses of coarse sand to pebbles, some medium sand, faint fuel oil-like odor					
				10		8-12			faint fuel oil-like odor	10
12-16		80	1-5 ppm		11.8-16: Yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand, trace pebbles, w/some 1-3 cm lenses of coarse sand to gravel, some medium sand, moderate fuel oil-like odor				moderate fuel oil-like odor	

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-30

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 04/02/03	Date Completed: 04/02/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 19.75'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 32.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80	1-2 ppm		16-19.2: Yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand, trace pebbles, faint naphthalene-like odor	16-18			slight naphthalene like odor	
			1-2 ppm		19.2-19.3: Black, tar saturated COARSE SAND, little medium sand, moderate tar-like odor 19.3-20: Yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand, trace pebbles, faint naphthalene-like odor				tar-like odor slight naphthalene like odor	0
20-24		80	1-2 ppm	20	20-28: Yellowish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand, trace pebbles to gravel, trace rust-red oxidation banding (<1 cm thick), no odor					
24-28		70	0 ppm			24-28				
28-32		70	0 ppm		28-32: Yellowish brown, moderately well sorted FINE SAND, some medium sand, trace coarse sand					-10

Legend: Physical Observations

None
Sheen
Stain
Heavy

Site Id: RSB-30

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 19.75'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 32.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
				40						-20

Legend: Physical Observations

None

Stain

Sheen

Heavy

Site Id: RSB-31

GEI Consultants, Inc.

Client:	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/03/03	Date Completed: 04/03/03
Ground Elevation: 20.57'	Datum: Ground Surface
Contractor: Zebra Environmental	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		40	0 ppm		0-0.2: Dark brown, root zone soil 0.2-4: Dark brown, FINE SAND to SILT, trace sand-sized glass, brick, coal fragments					20
4-8		60	0 ppm		4-7.2: Yellowish brown, moderately poorly sorted MEDIUM SAND, some coarse sand, trace pebbles, slight methane-like odor	4-7			slight methane like odor	
			450 ppm 300 ppm		7.2-7.7: Black stained, moderately well sorted MEDIUM SAND, trace coarse sand to pebbles, strong solvent-like odor, no free phase product (impacts similar to RSB-29 (7.5-9') 7.7-8: Gray, moderately well sorted MEDIUM SAND trace coarse sand to pebbles, no staining, moderate fuel oil-like odor	7.2-7.7		+	strong solvent like odor fuel oil like odor	
8-12		100	2-6 ppm	10	8-12: Grayish brown, moderately well sorted MEDIUM SAND, trace coarse sand, slight fuel oil-like odor	8-12			slight fuel oil-like odor	10
12-16		90	0 ppm		12-15.6: Grayish brown, moderately well sorted FINE to MEDIUM SAND, little coarse sand to pebbles, medium dense, no odor					

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-31

GEI Consultants, Inc.

Client:	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/03/03	Date Completed: 04/03/03
Ground Elevation: 20.57'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description (color, density, SOIL, admixture, moisture, other notes, ORIGIN.)	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80	0 ppm		15.6-16: Rust red stained, COARSE SAND to PEBBLES, loose 16-23: Yellowish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace trace fine sand, trace pebbles, medium dense	16-20				
20-24		75	0 ppm	20	23-28: Yellowish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace trace fine sand, trace pebbles, medium dense; with interstratified 3-8 cm thick layers of very well sorted FINE SAND, trace medium sand trace coarse sand, medium dense					0
24-28		55	0 ppm							

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-32

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 15.33'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: First spoon is 2.4 ft below ground surface inside a cotch basin.

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0–4		60	10–15 ppm		0–4.4: Black stained, moderately poorly sorted MEDIUM to COARSE SAND, some pebbles trace silt to clay, saturated with tar and water, irridescent sheen, very strong tar-like odor	0-4			very strong tar-like odor	
4–8		40	1–5 ppm		4.4–8: Black stained, moderately well sorted MEDIUM SAND, little coarse sand, trace gravel to pebbles, 30–40% pore spaces saturated with tar, moderate hydrocarbon irridescent sheen, strong naphthalene odor	4-8			strong naphthalene like odor	10
8–12		30	0 ppm	10	8–12: Reddish brown, moderately well sorted MEDIUM SAND, some coarse sand, trace fine sand, trace pebbles; some 2 cm thick lenses of coarse sand to pebbles, medium dense, saturated with tar and water, moderate naphthalene odor, no sheen				moderate naphthalene like odor	
12–16		40	0 ppm		12–16: Yellowish brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand to pebbles, faint naphthalene odor, no visual tar	12-16			faint naphthalene like odor	

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-32

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Remarks: First spoon is 2.4 ft below ground surface inside a catch basin.	

Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 15.33'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
										0
16–20		60	0 ppm		16–20: Reddish brown, some rust red oxidation mottling, moderately well sorted FINE to MEDIUM SAND, little coarse sand, trace pebbles, no odor					
20–24		70	0 ppm	20	20–24: Reddish brown, some rust red oxidation mottling, moderately well sorted, FINE to MEDIUM SAND, little coarse sand, trace pebbles, faint naphthalene odor				faint naphthalene like odor	
24–28		70	0 ppm		24–28: Reddish brown, some rust red oxidation mottling, moderately well sorted, FINE to MEDIUM SAND, little coarse sand, trace pebbles, no odor	24–28				−10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-33

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 03/31/03	Date Completed: 03/31/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 20.45'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 20.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		100	0 ppm		0-1.3: Blackish brown, moderately poorly sorted FINE SAND to PEBBLES, trace silt, loose					20
					1.3-3.9: Light brown, moderately well sorted MEDIUM SAND, little coarse sand, trace pebbles, dry					
4-8		100	0 ppm		3.9-8: Light brown, very poorly sorted MEDIUM SAND, some fine sand, some coarse sand, little pebbles, trace oxidation mottling from 6.5-8', moist					
8-12		90	0 ppm		8-10.5: Light brown to rust-red brown moderately well sorted, MEDIUM to COARSE SAND, little fine sand, trace pebbles, water saturated @ 8.0' bgs					
				10		8-12				10
			0 ppm		10.5-15: Light brown, moderately well sorted MEDIUM to COARSE SAND, little fine sand, trace pebbles					
12-16		80								

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-33

GEI Consultants, Inc.

Client: Keyspan Energy Corp.			
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters	Date Started: 03/31/03	Date Completed: 03/31/03
Remarks: Proportions Used: Trace...1-10% Little...11-20% Some...21-30% And...31-50%		Ground Elevation: 20.45'	Datum: Ground Surface
		Contractor: Zebra Environmantal	Total Depth: 20.00'
		Drilling Method: GEOPROBE	
		Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		60	0 ppm		15-20: Light brown, moderately poorly sorted MEDIUM SAND, some coarse sand, little fine sand, trace pebbles	16-20				
				20						0

Legend: Physical Observations — None, Stain, Sheen, Heavy

Site Id: RSB-34

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 03/31/03	Date Completed: 03/31/03
Ground Elevation: 20.50'	Datum: Ground Surface
Contractor: Zebra Environmontal	Total Depth: 32.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		100	0 ppm		0-4: Dark brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand, trace pebbles, dry					20
4-8		100	1-6 ppm		4-6.4: Light brown, moderately well sorted FINE to MEDIUM SAND, trace pebbles, water saturated @ 6.0' bgs, faint fuel oil-like odor				faint fuel oil-like odor	
			50-95 ppm		6.4-9.9: Gray, moderately poorly sorted MEDIUM to COARSE SAND, little pebbles, trace fine sand, strong fuel oil-like odor	6-8			strong fuel oil-like odor	
8-12		90								
			5-10 ppm	10	10-12: Light brown w/some rust red mottling; moderately poorly sorted, MEDIUM to COARSE SAND, some pebbles, little fine sand, trace silt, faint fuel oil-like odor	10-12			faint fuel oil-like odor	10
12-16		80	0 ppm		12-25: Light brown, moderately well sorted MEDIUM SAND, little coarse sand, trace fine sand, trace pebbles, trace rust red oxidation banding (1-2 cm thick)					

Legend: Physical Observations

None	Sheen
Stain	Heavy

Site Id: RSB-34

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 03/31/03	Date Completed: 03/31/03
Ground Elevation: 20.50'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 32.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80	0 ppm							
20-24		80	0 ppm	20						0
24-28		70	0 ppm		25-32: Light brown, moderately well sorted FINE to MEDIUM SAND, trace coarse sand to pebbles, medium dense	24-28				
28-32		70								

Legend: Physical Observations

None — Sheen — Stain — Heavy

Site Id: RSB-34

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters

Date Started: 03/31/03	Date Completed: 03/31/03
Ground Elevation: 20.50'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 32.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Proportions Used:
Trace...1-10%
Little...11-20%
Some...21-30%
And...31-50%

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
										-10
				40						-20

Legend: Physical Observations

None | Sheen | Stain | Heavy

Site Id: RSB-35

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 18.95'	Datum: Ground Surface
Contractor: Zebra Environmental	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Remarks: Location may be in area of former test pit

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description: color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
0-4		50	0 ppm		0-0.3: Dark brown, moderately well sorted SILT, some fine sand, little roots (root zone soil) 0.3-4: Dark brown, moderately poorly sorted FINE SAND to PEBBLES, trace coal fragments, trace brick fragments, trace bottom ash					
4-8		65	5-18 ppm		4-8: Medium brown, w/50% dark stained layers (2-4 cm thick), moderately poorly sorted MEDIUM SAND, little coarse sand to pebbles, tar saturated within dark stained layers, very strong tar-like odor, interval is scarified	4-8			very strong tar-like odor	
8-12		80	5-15 ppm	10	8-12: Interstratified layers of 1) grayish brown, moderately well sorted MEDIUM SAND, little coarse sand, trace pebbles, tar saturated, slight hydrocarbon irridescent sheen; and 2) well sorted FINE SAND, very heavy hydrocarbon sheen, strong tar-like odor. Medium sand layers make up approx. 20% of the 8-12' interval	10-12			strong tar like odor	10
12-16		80	0 ppm		12-16: Reddish brown, moderately well sorted FINE to MEDIUM SAND, little coarse sand, trace pebbles to gravel, trace rust-red oxidation banding, dense, no visual contamination, no odor	12-16				

Legend: Physical Observations

None — Sheen — Stain — Heavy

Site Id: RSB-35

GEI Consultants, Inc.

Client: Keyspan Energy Corp.	
Project Number: 982482-3	Project Name: Bay Shore/Brightwaters
Remarks: Location may be in area of former test pit	

Date Started: 04/02/03	Date Completed: 04/02/03
Ground Elevation: 18.95'	Datum: Ground Surface
Contractor: Zebra Environmantal	Total Depth: 28.00'
Drilling Method: GEOPROBE	
Logged By: John Bogdanski	Certified By:

Split Spoon Sample Depth (ft.)	Blows Per 6 Inches	Recovery %	PID	Depth (ft.)	Soil Description color, density, SOIL, admixture, moisture, other notes, ORIGIN.	Analyzed Sample Interval	Lithology	Physical Observations	Odors	Elevation (ft)
16-20		80	0 ppm		16-20: Reddish brown, moderately well sorted FINE to MEDIUM SAND, little coarse sand, trace pebbles to gravel, trace rust-red oxidation banding, dense					0
20-24		60	0 ppm	20	20-24: Yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand, trace pebbles, medium dense					
24-28		80	0 ppm		24-28: Yellowish brown, moderately well sorted MEDIUM SAND, trace coarse sand, trace pebbles, medium dense	24-28				-10

Legend: Physical Observations

None | Sheen | Stain | Heavy

Appendix C

IRM Technical Specifications and Drawings

TECHNICAL SPECIFICATIONS
FOR
INTERIM REMEDIAL MEASURE

OPERABLE UNIT No. 4
22 OAK STREET EXCAVATION
BAY SHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE

TO
NATIONAL GRID
INTERIM REMEDIAL MEASURE
PURCHASE ORDERS

TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

Division 01 General Requirements

Division 02 Existing Conditions

Division 31 Earthwork

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.1. PROJECT DESCRIPTION

A. The Bay Shore Former Manufactured Gas Plant (MGP) OU-4 22 Oak Street Interim Remedial Measure (IRM) consists of the excavation, removal, and off-Site disposal of MGP-related material and adjacent fill material that may be encountered. This includes, but is not limited to, the excavation and disposal of MGP-impacted material, design and installation of an excavation support system, and the restoration of the Site.

B. All tasks, requirements, deliverables, etc. contained in the Contract Documents are the sole responsibility of the Contractor unless specifically assigned to Others in the Contract Documents. Project Work performed by the Contractor includes:

1. Install, operate, and maintain temporary facilities and controls, including:
    a. Perimeter fence.
    b. Stormwater and erosion controls.
    c. Site worker health and safety measures.
    d. Equipment and personnel decontamination facilities.
    e. Site roadways and traffic controls.
    f. Sanitary facilities.
    g. Signs.
    h. Dust, odor, and vapor control.
    i. Excavated material (soil and debris) management/loading areas.
    j. Temporary enclosure.
2. Perform a pre-construction survey of the Site to 50 feet beyond the Project limits.
3. Establish additional survey control points as necessary.
4. Obtain all local permits required for completion of the IRM.
5. Provide contact information for all Subcontractors including transporters and disposal facilities for National Grid's approval.
6. Perform Site Work:
    a. Identify, temporarily relocate, or protect existing Site utilities and Site features to remain after the Work is complete.

b. Site preparation and Site clearing.

c. Demolition and removal of the existing building foundation.

d. Design, furnish, and install a temporary excavation support system.

e. Excavate, remove, and dispose of MGP-related impacted material off-Site, its overlying soil, and/or concrete and asphalt.

f. Abandon existing groundwater monitoring wells.

g. Site restoration and reinstall all disturbed Site appurtenances.

7. Provide clear pathways for Emergency Vehicles entering and exiting the Site.

8. Provide and perform any other equipment, Work, or submittals required to facilitate items 1 through 7 above and the Work shown on the Contract Drawings.

9. Prepare and implement a Contractor Health and Safety Plan (HASP) in accordance with the National Grid Supplemental Conditions.

10. Prepare and implement a Site Operations Plan.

1.2. CONTRACT DOCUMENTS

A. The Contract Documents include all Specifications, Contract Drawings, figures and conditions included or referenced in the Request for Proposal package, and any subsequent approved Change Orders.

B. It is not the intent of the Contract Documents to show every pipe, wire, conduit, utility connection, detail, and appurtenance necessary to complete the Work. However, such connections and details that may be necessary to complete the Work in accordance with Contract Documents, code requirements, and to the Engineer's satisfaction are to be included in the Work.

C. The organization and division of Work contained within the Contract does not make the Engineer or National Grid an arbitrator to establish contract limits between the Contractor and any Subcontractor.

D. Perform Work in accordance with the concepts and intent of the Operable Unit No. 4 22 Oak Street Excavation IRM Work Plan.

1.3. CONTRACTOR REQUIREMENTS

A. The Work will be performed on a known MGP-impacted Site.

B. Comply with the requirements of the National Grid Generic HASP, along with any Site-specific amendments, taking precautions as necessary to protect the public and work force personnel from potential hazards.

C. The Contractor is responsible for ensuring the performance of the Work complies with all appropriate local, state, and federal laws and regulations.

D. For any Work performed in close proximity to commercial properties, utilities, or any other third-party property, utilize every precaution to protect the property, utility lines, trees, walls, and other structures and related appurtenances from damage.

E. Repair any damage caused directly or indirectly outside the Project limits in a prompt manner as directed by National Grid and/or the Construction Manager at no additional cost to National Grid.

F. Identify plan for storage, lay down, and material handling facilities and locations with this bid submittal.

G. Representatives of regulatory agencies from New York State, Suffolk County, and the Town of Islip may be on-Site to observe and inspect the Work. Direct all communications with regulatory agency personnel to National Grid or their designee. The Contractor and his employees will not communicate with third party property owners without a National Grid representative present.

H. Do not conduct any work activities outside of the permitted working hours (Monday through Friday, 8:00 am to 4:00 pm) without advanced approval.

1.4. PROTECTION OF EXISTING UTILITIES

A. Contact and cooperate with utility companies to locate all utilities (including pipelines, cables, power poles, guy wires, and other structures) on the Site prior to beginning the Work.

B. Comply with the requirements of specific utility protection Laws or Regulations.

C. Protect all utilities from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, repair the utilities as required by the utility Owner at the Contractor's expense.

D. If a utility is encountered that is not shown on the Contract Drawings or otherwise made known to the Contractor prior to beginning the Work, promptly take necessary steps to ensure that the utility is not damaged, and give written notice to the Construction Manager and Engineer. The Engineer will review the conditions and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the utility.

E. Locate, cut, and cap underground utilities within the excavation limits.

1.5. DRAWINGS AND SPECIFICATIONS

A. Maintain at the Site two (2) copies of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, and other modifications, schedules and instructions, in good order. One set shall be marked to record all changes made during construction, and one set shall be kept clean of all markings. Make both sets available to National Grid, NYSDEC, the Construction Manager, and the Engineer at all times.

B. The Contract Drawings include notes. Refer to the Contract Drawings in conjunction with the Specifications.

1.6. WORK BY OTHERS

A. The demolition of the existing building structure and associated features at 22 Oak Street as depicted in Contract Drawings will be completed by Others prior to mobilization by the Contractor.

B. Building debris from the demolition of the existing 22 Oak Street structures will be removed from the Site by Others prior to mobilization by the Contractor.

C. Restoration of perimeter fencing at the completion of the Project will be performed by Others.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 11 00

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 GENERAL

1.1. SUMMARY

A. This section contains general restrictions to be followed during the performance of the Work. Other sections of the Specification may contain additional requirements/restrictions for performance of their specific subject matter.

1.2. WORK HOURS

A. Work is allowed to be performed between the hours of 8 a.m. and 4 p.m., 5 days per week, Monday through Friday.

B. Any exceptions to the allowable work hours noted above must be approved in advance by the CM.

1.3. COMMUNICATION WITH THIRD PARTIES

A. Representatives of state and federal regulatory agencies and other local civic organizations may be on-Site to observe and inspect the Work.

B. Communications with regulatory agency personnel, the public, or third parties shall be directed to the CM and Engineer.

C. Do not communicate with the media/press, Project stakeholders, elected officials, the public, etc. regarding the Work. Refer all external questions and comments to the CM.

1.4. LAYDOWN AND STORAGE AREAS AND CONTRACTOR PARKING

A. On-Site laydown and storage areas are available for use at the locations noted on the Contract Drawings.

B. Additional space for Contractor and support and site vehicle parking will be provided on OU-1 North located at the western end of Oak Street across 5th Avenue. The entrance to the OU-1 property is on the west side of the property on N. Clinton Avenue.

C. Contractors may directly negotiate for additional off-Site space at no additional cost to National Grid beyond the Contractor's base bid, if desired.

D. Refer to Specification Section 31 10 00 – Site Preparation for additional details on the use of laydown areas.

1.5. TRAFFIC MANAGEMENT

A. Vehicles transporting construction equipment or materials to or from the Site may not travel on local streets. Construction vehicles may only utilize expressways and the project truck route as depicted in the Contract Drawings.

B. Do not queue trucks and equipment off-site or inhibit the use of driveways and parking spaces for local businesses or residences.

C. Maintain traffic flow and traffic controls in accordance with all appropriate federal, state, and local laws and to the satisfaction of National Grid and the CM.

D. Provide dedicated flagging services for traffic entering and exiting the Site.

E. Sweep truck route a minimum of once per day or as directed by National Grid or the CM.

1.6. CONSTRUCTION NOISE

A. Take reasonable precautions to minimize noise generated during the performance of the Work. To the extent practicable, perform noise-producing work in less sensitive hours of the day or week as directed by CM.

B. The Contractor is responsible for conducting all Work in accordance with the provisions of the Town of Islip Code Part 35 – Noise.

1.7. RESTRICTIONS ON AIR EMISSIONS OF DUST AND TOXIC CHEMICALS

A. The Contractor is responsible for conducting all Work in accordance with the applicable laws and regulations concerning airborne emissions of dust particulates and toxic chemicals and the Site-specific Community Air Monitoring Plan (CAMP).

B. Control the Work so that concentrations of airborne constituents measured at the Site perimeter are below the Action Levels specified in the CAMP.

C. The CM shall have the authority to direct the Contractor to stop Work or modify Work methods and activities as necessary to enforce compliance with the Action Levels detailed in the CAMP. Work stoppages caused by the Contractor's failure to comply with the CAMP will not be considered valid grounds for a Change Order and will not qualify for reimbursement as Standby Time.

D. Refer to the Site-specific CAMP for additional details on alert levels, notifications, etc. that are to be adhered to during the performance of the Work.

1.8. EQUIPMENT LEFT ON-SITE

A. Secure all equipment left on-Site outside of standard work hours.

B. Ensure that all equipment, where feasible, is de-energized and not in use when left on-Site to prevent electrical/fire/explosive hazards. The Contractor is responsible for the security, operation, and maintenance of any systems that require such services outside standard work hours. If systems are operational outside the standard work hours, always provide oversight when equipment is in operation or provide an electronic monitoring system with a remote communication feature to alert the appropriate personnel of a system failure. Repair system failures in a timely manner so that the Project schedule is not affected.

C. All vehicles must comply with the State of New York idling statutes.

D. To the extent practicable, relocate equipment to the laydown areas at the conclusion of each workday.

E. Maintain fully furnished spill kits on-Site at all times.

F. As part of the daily safety meeting, conduct daily inspections of on-Site equipment for fuel and hydraulic leaks, equipment fatigue, and general cleanliness.

G. Decontaminate equipment when it is being relocated into support zones from locations where contaminated material was being handled.

H. Stage equipment must be completely decontaminated on a decontamination pad before the equipment is used in non-impacted work zones.

PART 2 MATERIALS

(Not Applicable)

PART 3 EXECUTION

3.1. ENVIRONMENTAL PROTECTION

A. For the purposes of this specification, environmental protection is defined as the retention of the environment in its natural state to the greatest extent possible during construction and to enhance its natural appearance at the conclusion of the Work. Comply with all applicable/relevant and appropriate federal, state, and local laws and permit conditions regarding any potential environmental impacts arising from the performance of the Work.

B. The CM will notify the Contractor of any instances of non-compliance with federal, state, and local laws or permit conditions and identify corrective actions to be taken. State or local agencies may also provide notification of non-compliance with state or local requirements. After receipt of the notice, immediately prepare to take corrective action, inform the CM of the proposed corrective action, and take such actions once they are approved by the CM. Failure or refusal to promptly comply may result in the CM issuing an order suspending or halting parts of or all the Work until satisfactory corrective action has been taken. Claims for extensions of time or for excess costs or damages due to a Stop Work Order for situations described above will be denied.

C. Do not pollute any stream, river, waterway, roadway, or soil with fuel, oil, grease, lubricant, hydraulic fluid, bitumen, calcium chloride, acid, base, or other harmful materials. Comply with the appropriate federal, state, and local regulations and guidelines for the handling and disposal of all materials.

D. Lawfully dispose of any debris resulting from the performance of the Work. Disposing of any debris, soil, water, effluent, byproduct, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, other harmful material, etc. in or adjacent to the Project area is unacceptable. Remove any unauthorized dumped materials and restore the area as directed by the CM. If necessary, areas contaminated as a result of unauthorized activity, failure of environmental controls, or dumping by the Contractor will be remediated at no additional cost to National Grid.

E. Dispose of all contaminated materials (debris, soil, water, effluent, geomembrane, byproduct, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, used erosion controls, other harmful material, etc.) resulting from the Work in accordance with all applicable/relevant and appropriate federal and state laws, the Contractor's Site Operations Plan, and Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials prior to completion of the Work.

END OF SECTION 01 14 00

SECTION 01 18 00
UTILITY PROTECTION

PART 1 GENERAL

1.1. SUMMARY

A. This specification contains the requirements for the location and protection of utilities affected by the performance of the Work.

1.2. UTILITY COORDINATION

A. The Contractor is solely responsible for any and all required notifications to utility companies prior to commencing the Work, and for response to any emergencies that may arise during the Work. Certain active and inactive utilities may currently be present at the Site. The exact location and type of utility is to be determined by the Contractor without reliance on information provided by National Grid or the Engineer. Several utilities may currently serve the Site or adjacent properties including, but not limited to, electric, natural gas, water, sanitary sewer, storm sewer, and telephone/other communications (e.g. fiber optic cable).

1.3. PROTECTION OF EXISTING UTILITIES

A. Comply with the requirements of all applicable utility protection laws or regulations.

B. Contact and cooperate with utility companies to locate all utilities (including pipelines, cables, power poles, guy wires, and other structures) on the Site prior to beginning the Work.

C. Protect all utilities from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, repair the utilities as required by the utility's owner at the Contractor's expense.

D. Provide support for all utilities encountered within the excavation areas, unless otherwise indicated to be removed or abandoned.

E. If a utility is encountered that is not shown on the Contract Drawings, or otherwise not made known to the Contractor prior to beginning the Work, promptly take the necessary steps to assure that the utility is not damaged, and notify National Grid in writing of the presence of the utility. National Grid will review the conditions and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the utility.

F. Immediately notify National Grid of any incident involving a utility.

1.4. SUBMITTALS

A. Submit a utility survey as detailed in Specification Section 01 33 00 – Submittals.

B. Immediately provide verbal notification to the Engineer and National Grid following any incident causing direct or indirect damage to a utility. Additionally submit a utility incident report to National Grid within 4 hours of any such incident. At a minimum, document the following items in a utility incident report:

1. Description of the incident.
2. Damage assessment.
3. Corrective actions taken and further actions that may be required.
4. Initial estimate on the need for permanent repairs.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1. GEOPHYSICAL SURVEY

A. Complete a geophysical survey within and beyond the limits of the planned excavation. Geophysical survey will include the use at least two of the following methods: Ground Penetrating Radar (GPR), Magnetometer, M-Scope, Electrical Conductivity, Electrical Resistance, and/or Acoustics to identify subsurface anomalies.

B. Locate all subsurface anomalies detected during the survey and include in the utility survey submittal.

3.2. UTILITY CONFIRMATION TEST PITS

A. If a subsurface anomaly or utility line is in line with the excavation limits or could be crossing the excavation limits, then a confirmation test pit will be required to expose and physically verify the exact location and configuration of all nearby utilities.

B. Utility clearance test pits will be excavated to a minimum of 5-feet below ground surface using non-mechanical methods, such as hand auger, post-hole digger, and/or vacuum truck.

C. The length of the test pit should extend throughout the tolerance zone for the subsurface anomaly/utility line. If not previously marked, the tolerance zone will be defined in the field as the distance of one-half of the known diameter of the utility plus two feet on either side of the centerline as marked out.

END OF SECTION 01 18 00

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1. SUMMARY

A. The items listed in Price Schedule constitute all of the pay items for completion of the Work.

1.2. PAYMENT TERMS

A. See National Grid Terms and Conditions, and Supplemental Conditions.

B. Payment will not be made unless the proper support documentation has been submitted and approved by National Grid or National Grid's representative.

C. Payment includes full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals, erection, application, or installation of an item of the Work, including overhead and profit.

D. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Loading, hauling, and disposing of rejected materials.
6. Products remaining on hand after completion of Work.
7. Additional Work undertaken to expedite Contractor's operations.
8. Repair or replacement of monitoring wells, utilities, or any other facilities property located within or adjacent to the Work Area

E. Payment will be made by National Grid for all Work actually performed during a particular payment period. Payments for lump sum items will be made based on the percent completion of the pay item upon approval by the Construction Manager. Judgments of percent completion of lump sum items will be made in reference to the Schedule of Quantities and Prices.

F. Retainage (10 percent) will be withheld from payments as specified in the Agreement.

1.3. SUBMITTALS

A. Submit a Project Price Schedule and Bid Form signed and sealed with a Company Seal by a Company Officer.

B. Submit invoices monthly in accordance with the terms of the Agreement.

1.4. QUANTITY ESTIMATES

A. Verify estimated quantity for unit prices in the field.

B. For all Unit Price Work, the Contract Price will include an amount equal to the sum of the unit price for each pay item times the estimated quantity of each item as indicated in the Bid Form. The estimated quantities shown on the Project Price Schedule are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price. Quantities and measurements supplied or placed in the Work in accordance with the Specifications and Contract Drawings and verified by the Construction Manager will determine payment.

C. The Construction Manager will determine the actual quantities and classifications of Unit Price Work performed by the Contractor. The Construction Manager will review with the Contractor the preliminary determinations before rendering a written decision on an Application for Payment.

D. If the actual Work requires more or fewer units than the estimated units indicated on the Project Price Schedule, provide the required units at the contracted unit prices. Under no circumstances may the Contractor exceed stated quantities without prior written approval from the Construction Manager.

E. The Construction Manager reserves the right to increase or decrease any quantity or to eliminate any line item as a result of actual conditions encountered during the performance of the Work.

1.5. MEASUREMENT OF QUANTITIES

A. Measurement by Weight:

1. Weigh Scales: Certified in accordance with applicable laws and regulations for the state in which the scales are located. Scales must have been certified within a period of not more than one year prior to date of use for weighing commodity.

2. The term “ton” will mean the short ton consisting of 2,000 pounds.

3. For shipments to off-Site disposal facilities, trucks will be weighed at the receiving facility for the purpose of measuring the quantity of Work for payment.

B. Measurement by Volume:

1. Volumes measured as in-place volumes will be determined by survey and approved by the Construction Manager. Retain the services of an independent land surveyor, licensed or registered in the State of New York, whose determination of in-place volumes will be authoritative and final for the purpose of measurement for payment. To compute in-place volumes of excavation, the average end area method or other methods acceptable to the Construction Manager will be used.

C. Measurement by Area:

1. Measured by square dimension using length and width or radius, and verified by the Construction Manager

D. Linear Measurement:

1. Measured by linear dimension, at the item centerline or mean chord, and verified by the Construction Manager.

E. Measurement by Time:

1. Measure by the actual time rounded to the nearest time unit and verified by the Construction Manager.

1.6. ASSESSMENT OF NON-CONFORMING WORK

A. Replace Work, or portions of the Work, that do not conform to the requirements of the Specifications and Contract Drawings, as assessed by the Engineer.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the non-conforming Work, the Engineer will direct one of the following remedies:

1. The non-conforming Work may remain, but the unit price will be adjusted to a new price at the discretion of the Engineer.

2. Partially repair non-conforming Work to the instructions of the Engineer, and the unit price will be adjusted to a new price at the discretion of the Engineer.

C. The individual Specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of the Engineer to assess non-conforming Work and identify payment adjustment is final.

1.7. ELIMINATED ITEMS

A. Should any items contained in the Contract Drawings or Specifications be found unnecessary for the proper completion of the Work, the Engineer may, upon written order to the Contractor, eliminate such items from the Work, and such action will in no way invalidate the Agreement.

B. Contractor will be paid for actual Work done and all documented costs incurred, including mobilization of materials prior to elimination of such items.

1.8. MEASUREMENT AND PAYMENT OF BID ITEMS

A. The Project Price Schedule lists the Bid items and unit price items for the Work. Measurement and payment of the Work covered by the Contract Documents is specified below.

B. At the direction of the Construction Manager, the Contractor may be asked to perform Change Order Work on a Time and Materials (T&M) basis. The unit rate schedule included in the Contractor's proposal will be the basis for measurement and payment of equipment and labor for T&M. Include overhead and profit on the Contractor unit rate schedule for T&M Work.

C. The following paragraphs specify measurement and payment of the Bid items listed on the Project Price Schedule (attached to this Specification):

Item 1 Mobilization/Demobilization

1. Work required to complete Mobilization/Demobilization includes, but is not limited to:
   a. Movement of personnel, equipment, and materials to the Site, if such movement is not included in any other Bid Item.
   b. Preconstruction coordination meetings.
   c. Preparation, submittal, and revision of all required pre-mobilization submittals as described in Specification 01 33 00 - Submittal Procedures.
   d. Demobilization of all personnel, equipment, and materials from the Site.
2. Mobilization/Demobilization will be measured for payment as one unit, complete as specified.
3. Payment for Mobilization/Demobilization will be made in accordance with the lump sum price for the Bid item "Mobilization/Demobilization" listed on the Project Price Schedule. Payment of the lump sum price for "Mobilization/Demobilization" will constitute full compensation for all labor, supervision, materials, equipment, start up submittals, incidentals and all other costs necessary to complete Mobilization/Demobilization Work, including the transport of all equipment, labor and temporary facilities and materials to and from the Site.

Item 2 Site Preparation

1. Work required to complete the Site Preparation includes, but is not limited to:
   a. Implement requirements for environmental protection as specified in Specification Section 01 50 00 – Temporary Facilities and Controls unless specifically identified as being provided by Others.
   b. Provide and maintain temporary fencing as shown on the Contract Drawings.
   c. Remove existing pavement and fences as specified in the Contract Drawings.
   d. Clearing, grubbing, and leveling of Work Zones as detailed in the Contract Drawings.
   e. Removal and off-Site disposal of existing debris on the Project Site.

f. All other one-time activities required by the Contractor to complete the Work, unless included in another pay item or specifically identified as being the responsibility of Others.

2. Site Preparation will be measured for payment as one unit, complete as specified.

3. Payment for Site Preparation will be made in accordance with the lump sum price for the Bid item "Site Preparation" listed on the Project Price Schedule. Payment of the lump sum price for "Site Preparation" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete the Site Preparation Work, as specified in Specification Section 01 50 00 – Temporary Facilities and Controls, and 31 10 00 – Site Preparation.

Item 3 Temporary Facilities and Controls

1. Work required to complete the Temporary Facilities and Controls includes, but is not limited to:

   a. Provide an odor/vapor suppressant foam generator and labor. Foam expendables will be paid under bid item 12.

   b. Implement the health and safety requirements specified in the approved Contractor Site Operations Manual as detailed in Specification Section 01 31 00 – Administrative Requirements.

   c. Install and maintain temporary facilities and controls as specified in Specifications Section 01 50 00 - Temporary Facilities and Controls, unless specifically identified as being provided by Others. Properly dispose of decontamination liquids or sediments generated during decontamination.

   d. Maintain full-time security presence at the site (24-hour per day, 7 days per week)to prevent unauthorized access to the Site. Site personnel may fill this role during working hours.

   e. Conduct any surveying needed to control and document the Work.

   f. Project management and oversight as specified in Section 01 31 00 - Administrative Requirements.

   g. Maintain and repair all temporary facilities and controls including those provided by Others during the period when Work is taking place at the Site.

   h. All other recurring activities required by the Contractor to complete the Work, unless included in another pay item or specifically identified as being the responsibility of Others.

2. Temporary Facilities and Controls will be measured for payment as one unit, complete as specified.

3. Payment for Temporary Facilities and Controls will be made on a percent complete basis of the lump sum price for the Bid item "Temporary Facilities and Controls" listed on the Project Price Schedule. Payment of the lump sum price for "Temporary Facilities and Controls" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete the Temporary Facilities and Controls Work, as specified in Specification Section 01 50 00 – Temporary Facilities and Controls.

Item 4 Well Abandonment

1. Work required to complete the Well Abandonment includes the abandonment of all monitoring wells shown on the contract drawings, as specified in Specification Section 02 41 00 – Demolition.

2. Well Abandonment will be measured for payment as one unit, complete as specified.

3. Payment for Well Abandonment will be made in accordance with the lump sum price for the Bid item "Well Abandonment" listed on the Project Price Schedule. Payment of the lump sum price for "Well Abandonment" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete the Well Abandonment Work, as specified in Specification Section 02 41 00 – Demolition.

Item 5 Excavation

1. Work required to complete Excavation includes, but is not limited to:

   a. Excavation of impacted soils.

   b. Management of exposed and stockpiled soils, including, but not limited to, application of dust control measures and covering surfaces with tarpaulins. This does not include labor associated with operation of the rusmar foam unit (included under Item 5) and foam expendables (included under Item 12).

   c. Loading of impacted material for off-Site disposal.

2. Soil Excavation Work will be measured for payment on an in place cubic yard basis, as verified by survey.

3. Payment for Excavation Work will be made in accordance with the unit price for the Bid item "Excavation" listed on the Project Price Schedule. Payment of the unit price for "Excavation" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Excavation Work, as specified in Specification Section 31 23 00 – Excavation and Fill.

Item 6 Transportation and Disposal: Soil

1. Work required to complete the Transportation and Disposal: Soil pay item includes, but is not limited to:
    a. Transportation and disposal of excavated soil from the Project Site to the National Grid-approved disposal facilities in accordance with Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials.
    b. Designing the Project excavation and sequencing so as not to exceed the capacity of the disposal facility to accept excavated materials.
2. Transportation and Disposal: Soil will be measured for payment on a per ton basis, as documented by disposal facility scale weight tickets.
3. Payment for Transportation: Soil Work will be made in accordance with the unit price for the Bid item "Transportation and Disposal: Soil" listed on the Project Price Schedule. Payment of the unit price for "Transportation and Disposal: Soil" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Transportation and Disposal: Soil Work, as specified in Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials.

Item 7 Transportation and Disposal: Construction Debris

1. Work required to complete the Transportation and Disposal: Construction Debris pay item includes, but is not limited to:
    a. Transportation and disposal of excavated non-impacted construction debris from the Project Site at the National Grid-approved disposal facility identified in the Contractor Site Operations Plan in accordance with Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials.
    b. Designing the Project excavation and sequencing so as not to exceed the capacity of the disposal facility to accept debris generated during the performance of the Work.
2. Transportation and Disposal: Construction Debris will be measured for payment on a per ton basis, as documented by disposal facility scale weight tickets.
3. Payment for Transportation and Disposal: Construction Debris Work will be made in accordance with the unit price for the Bid item "Transportation and Disposal: Construction Debris" listed on the Project Price Schedule. Payment of the unit price for "Transportation and Disposal: Construction Debris" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Transportation and

Disposal: Construction Debris, as specified in Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials.

Item 8 Transportation and Disposal: Wastewater

1. Work required to complete the Transportation and Disposal: Wastewater pay item includes, but is not limited to:
   a. Transportation of wastewater and decontamination fluids from the Project Site to the National Grid-approved disposal facilities in accordance with Specification 02 61 00 – Removal and Disposal of Contaminated Materials.
   b. Designing the Project phasing so as not to exceed the capacity of the disposal facility to accept wastewater generated.
2. Disposal will be measured for payment on a per gallon basis, as documented by an appropriately calibrated and inspected flow meter at the receiving facility.
3. Payment for Transportation and Disposal: Wastewater Work will be made in accordance with the unit price for the Bid item "Transportation and Disposal: Wastewater" listed on the Project Price Schedule. Payment of the unit price for "Transportation and Disposal: Wastewater" will constitute full compensation for all labor, supervision, fees, materials, equipment, incidentals and all other costs necessary to complete Transportation and Disposal: Wastewater Work, as specified in Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials.

Item 9 Installation/Removal of the Excavation Support System

1. Work required to complete the Installation/Removal of the Excavation Support System includes, but is not limited to:
   a. Design of an excavation support system meeting the requirements of Specification Section 31 41 00 – Shoring.
   b. Movement of personnel, equipment, and materials to the Site, required for the installation and removal of the excavation support system.
   c. Installation of the excavation support system.
   d. Installation of the instrumentation required for monitoring the performance of the excavation support system.
   e. Removal of the excavation support system and associated instrumentation after completion of the IRM.
2. Installation/Removal of the Excavation Support System Work will be measured for payment as one unit, complete as specified.

3. Payment for Installation/Removal of the Excavation Support System will be made in accordance with the lump sum price for the Bid item "Installation/Removal of the Excavation Support System" listed on the Project Price Schedule. Payment of the lump sum price for "Installation/Removal of the Excavation Support System" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete the Installation/Removal of the Excavation Support System Work, as specified in Specification Section 31 09 00 – Geotechnical Instrumentation and 31 41 00 - Shoring.

Item 10 Placement of Approved Off-Site Backfill Material - Gravel Fill

1. Work required to complete Placement of Approved Off-Site Backfill Material – Gravel Fill includes, but is not limited to:
   a. Sampling, delivery, placement, and compaction of approved Gravel Fill, as specified in Specification Section 31 23 00 – Excavation and Fill.
   b. Placement of a demarcation barrier at the vertical extent of the excavation, where indicated.
   c. The placement of a geotextile filter fabric above the gravel fill to separate it from the subsequent layer of backfill.
2. Backfill with Approved Off-Site Backfill Material – Gravel Fill will be measured for payment on an in place cubic yard basis as verified by survey.
3. Payment for Placement of Approved Off-Site Backfill Material – Gravel Fill Work will be made in accordance with the unit price for the Bid item "Placement of Approved Off-Site Backfill Material– Gravel Fill" listed on the Project Price Schedule. Payment of the unit price for "Placement of Approved Off-Site Backfill Material – Gravel Fill" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Placement of Approved Off-Site Backfill Material – Gravel Fill Work, as specified in Specification Section 31 23 00 - Excavation and Fill.

Item 11 Placement of Approved Off-Site Backfill Material - Clean Fill

1. Work required to complete Placement of Approved Off-Site Backfill Material – Clean Fill includes, but is not limited to:
   a. Sampling, delivery, placement, compaction, and density testing of approved Clean Fill, as specified in Specification Section 31 23 00 - Excavation and Fill.
2. Placement of Approved Off-Site Backfill Material – Clean Fill will be measured for payment on an in place cubic yard basis as verified by survey.

3. Payment for Placement of Approved Off-Site Backfill Material – Clean Fill Work will be made in accordance with the unit price for the Bid item "Placement of Approved Off-Site Backfill Material – Clean Fill" listed on the Project Price Schedule. Payment of the unit price for "Placement of Approved Off-Site Backfill Material – Clean Fill" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Placement of Approved Off-Site Backfill Material – Clean Fill Work, as specified in Specification Section 31 23 00 – Excavation and Fill.

Item 12 Odor Control Foam– Expendables

1. Work required to complete Odor Control Foam– Expendables includes, but is not limited to:
   a. Furnish odor control foam as directed by the Construction Manager and/or the Engineer.
2. Odor Control Foam– Expendables will be measured for payment by the drum of odor suppressant concentrate(s) used, as directed by the Construction Manager and/or the Engineer.
3. Payment for Odor Control Foam– Expendables Work will be made in accordance with the unit price for the Bid item "Odor Control Foam– Expendables" listed on the Project Price Schedule. Payment of the unit price for "Odor Control Foam– Expendables" will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Odor Control Foam– Expendables Work, as directed by the Construction Manager and/or the Engineer.

Item 13 Placement of Approved Off-Site Backfill Material – Gravel Surface Course

1. Work required to complete Placement of Approved Off-Site Backfill Material – Gravel Surface Course includes, but is not limited to:
   a. Delivery, placement, and compaction of approved Gravel Surface Course, as specified in Specification Section 31 23 00 - Excavation and Fill.
2. Placement of Approved Off-Site Backfill Material – Gravel Surface Course will be measured for payment on an in place cubic yard basis as verified by survey.
3. Payment for Placement of Approved Off-Site Backfill Material – Gravel Surface Course Work will be made in accordance with the unit price for the Bid item "Placement of Approved Off-Site Backfill Material – Gravel Surface Course" listed on the Project Price Schedule. Payment of the unit price for "Placement of Approved Off-Site Backfill Material – Gravel Surface Course" will constitute full compensation for all labor, supervision, materials,

equipment, incidentals and all other costs necessary to complete Placement of Approved Off-Site Backfill Material – Gravel Surface Course Work, as specified in Specification Section 31 23 00 – Excavation and Fill.

Alt 1 Transportation: Hazardous Waste Soil and Debris

1. Work required to complete Transportation: Hazardous Waste Soil and Debris includes but is not limited to:
   a. Transportation of hazardous waste soil and debris, if encountered, to a National Grid-approved disposal facility in accordance with Specification 02 61 00 – Removal and Disposal of Contaminated Materials.
2. Based on the sampling conducted to date, it is not anticipated that hazardous waste will be generated during this IRM.
3. Transportation: Hazardous Waste Soil and Debris will be measured for payment on a per ton basis, as documented by approved disposal facility scale weight tickets.
4. Payment for Transportation: Hazardous Waste Soil and Debris Work will be made in accordance with the unit price for the Bid item “Transportation: Hazardous Waste Soil and Debris” listed on the Project Price Schedule. Payment of the unit price for “Transportation: Hazardous Waste Soil and Debris” will constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Transportation: Hazardous Waste Soil and Debris Work, as specified in Specifications Section 02 61 00 – Removal and Disposal of Contaminated Materials.

Alt 2 Soil Amendment – Ton

1. Work required for Soil Amendment - Ton includes, but is not limited to:
   a. Blending Cement Kiln Dust (CKD) or other Engineer approved amendment to reduce the moisture content of soil to a level that meets the requirements of the disposal facility.
2. Soil Amendment - Ton will be measured for payment on a per ton basis of CKD or other Engineer approved amendment used, as directed by Engineer.
3. Payment for Soil Amendment - Ton will be made in accordance with the unit price for the Bid item “Soil Amendment - Ton” listed on the Project Price Schedule. Payment of the unit price for “Soil Amendment - Ton” will constitute full compensation for the amendment of soils for moisture reduction at the direction of the Engineer, including all labor, equipment, and incidentals to blend and mix CKD with excavated soils. Where gravity dewatering is specified, Soil Amendment – Ton will only be reimbursed if

gravity dewatering is being performed to the satisfaction of the Construction Manager and/or the Engineer and soil still requires amendment prior to transportation and disposal.

Alt 3 Excavation Standby Time - Day

1. Payment for Excavation Standby Time – Day will be made on a day basis unit price as listed on the Project Price Schedule. Payment for Excavation Standby Time – Day will constitute full compensation for cease excavation Work at the direction of the Construction Manager for reasons not chargeable to the Contractor. The Excavation Standby Time – Day pay item assumes that labor will be reassigned and thus labor costs will not be included in this pay item.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 20 00

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1. SUMMARY

A. This section describes the minimum level of coordination and meetings required to execute the Work in accordance with the National Grid Terms and Conditions. Additional meetings and/or other coordination may be required.

1.2. SCHEDULING AND PHASING

A. The Work will be performed in a single mobilization

1.3. ON-SITE CONSTRUCTION MANAGEMENT

A. National Grid may maintain a full time Construction Manager on-Site for the duration of the Work. This Construction Manager will be responsible for contractual oversight of the Work. The Construction Manager will also be responsible for observing the Work relative to conformance with the technical requirements of the Contract Drawings and Specifications.

B. The Engineer will maintain a full-time on-Site representative for the duration of the Work. The Engineer will be responsible for construction quality assurance, ensuring that the Work is completed in accordance with the Contract Documents, and final certification of the Work.

C. Maintain a full-time on-Site Superintendent, who will be responsible for QA/QC, and Contractor health and safety. The Superintendent will be responsible coordinating the schedule and for the completion of the Work in accordance with the Contract Documents. The Superintendent will be responsible for the supervision and/or coordination of all Contractor employees, Subcontractors, manufacturers, fabricators, suppliers, distributors, installers, and testing agencies whose services, materials, or equipment are required to ensure the completion of the Work. The Superintendent must have sufficient qualifications, experience, and authority to act as a single point of contact for the on-Site staff, and to make adjustments to the means and methods as needed and as requested by National Grid, the Construction Manager, and the Engineer.

1. The Contractor shall not change the on-Site Superintendent for the duration of the IRM. Any request to change the Superintendent will be made in writing a minimum of 30 days prior to the proposed change.

D. Maintain a dedicated full-time on-Site Health and Safety officer in accordance with the National Grid Supplemental Conditions. The Health and Safety officer will have no other on-Site responsibilities or duties outside of health and safety.

E. New York State Department of Environmental Conservation (NYSDEC) may maintain a part/full-time field representative for the duration of the Work. NYSDEC will be responsible for administration of the IRM.

1.4. MEETINGS

A. Attend Project meetings on a weekly basis during the term of the Agreement.

B. A post-award meeting will be held at National Grid's Hicksville, New York office, the Site, or via teleconference to discuss Project submittals, schedule, etc. Contractor's Officer-in-Charge, Project Manager, and Superintendent for the Project will attend the meeting.

C. A pre-construction meeting will be held, in accordance with the National Grid Supplemental Conditions, at the Site prior to start of Work. At a minimum, the Contractor's Project Manager and/or Superintendent for the Project will attend the meeting. It is recommended that the Contractor assemble input from the primary Subcontractors.

1. This meeting is intended to make certain that the Work is properly scheduled, responsibilities are coordinated among Subcontractors and suppliers, and that those responsibilities are reflected on the Contractor's submittals. Questions concerning the administrative requirements outlined during the Pre-construction conference or any other aspect of the Project may also be addressed.

D. Beginning with the mobilization on the Site, facilitate weekly construction meetings for the duration of the Work. Prior to mobilization and if necessary, bi-weekly meetings may be held via teleconference. After mobilization, weekly meetings will be held at the Site. Present a progress update at all weekly construction meetings to include all tasks completed from the prior week, currently active tasks, and tasks/activities planned for the next two weeks.

E. The standard meeting day and time for the weekly construction meeting will be established based on mutual agreement with the Construction Manager, Engineer and the other participants. Prior to each weekly meeting the Construction Manager will prepare a meeting agenda.

F. Special construction meetings will be held at the Site or other designated locations to discuss urgent construction issues. The Contractor, National Grid, the Construction Manager, the Engineer, or NYSDEC may call special construction meetings. Coordination (agenda, meeting minutes, location, time, and attendance) of special construction meetings is the responsibility of the organization calling the meeting. Special construction meetings will be called judiciously.

G. Ensure weekly construction meeting and special construction meeting attendance by all Contractor staff required to discuss and make decisions relative to the meeting agenda.

H. Make physical arrangements for meetings to be held on-Site.

I. All expenses associated with attending the meetings, except those that are incurred by National Grid, their representatives or consultants shall be borne by the Contractor.

1.5. REQUESTS FOR INFORMATION, CLARIFICATIONS, AND CHANGES

A. All Contractor communications regarding discrepancies, claims, and change conditions will be made in accordance with the National Grid Terms and Conditions.

B. All Contractor requests for Project information and clarifications or changes in the requirements of the Contract Documents must be made in writing to National Grid, the Construction Manager and the Engineer.

C. Written requests must be provided regardless of any preceding conversations and preliminary decisions regarding the matter(s) subject to the requests.

D. At National Grid's discretion, email communications may qualify as "requests made in writing" for the purposes of this provision.

E. National Grid or the Construction Manager will provide written responses to the request.

F. At their discretion, National Grid or the Construction Manager may provide verbal approvals of requests to expedite the Work. In such cases, the Contractor is still required to provide written documentation of request and National Grid or Construction Manager approval.

G. National Grid, the Construction Manager, or the Engineer may also issue clarifications and/or amendments based on their own assessment of Project needs.

H. Any potential increases or decreases in Contractor compensation due to amendments will be in accordance with the provisions of the National Grid Terms and Conditions.

I. National Grid and/or their representative will issue the Contractor supplemental instructions authorizing minor changes in the Work that may or may not involve adjustments to the Contract Price or the schedule.

J. If latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes in the Work by submitting a detailed request to include labor rates, equipment rates, material costs, etc. for a change to National Grid and/or their representative.

K. Document Change Order requests in accordance with the requirements of the National Grid Terms and Conditions, Supplemental Conditions, and with the procedures set forth by National Grid during procurement.

L. The Engineer may issue an Authorization for Contract Change (ACC) on behalf of National Grid, which instructs the Contractor to proceed with a change in the Work, for subsequent inclusion for a Change Order. Any ACC must be authorized by National Grid in advance and signed by the Engineer and National Grid.

1.6. COMMUNITY RELATIONS

A. National Grid will provide all external communication with the media/press, Project stakeholders, elected officials, public, etc. Do not communicate with the media/press, project stakeholders, elected officials, public, etc. regarding the Work. Refer all external questions and comments to National Grid.

1.7. RECORDS

A. Maintain on-Site copies of all Project correspondence and Project documents generated during the Work.

1.8. PRE-MOBILIZATION SUBMITTALS

A. All submittals are subject to review and approval by National Grid, the Construction Manager, and the Engineer. Follow the procedures detailed in Specification Section 01 33 00 – Submittal Procedures when submitted items for review.

B. Contractor Health and Safety Plan:

1. Submit Contractor Health and Safety Plan in accordance with the Supplemental Conditions.

2. Include relevant safety information for all proposed and likely Site activities.

C. Critical Path Method Project Schedule:

1. Prepare a Critical Path Method (CPM) Project schedule. Update and disseminate the schedule on a weekly basis prior to the weekly construction meetings.

D. Pre-Construction Survey Results:

1. Perform a pre-construction survey of the Site to 50 feet beyond the Project limits under the supervision of the Engineer.

2. Submit the findings of the pre-construction survey to the Construction Manager and the Engineer for review and approval prior to mobilization.

3. Include video/photographic documentation of the existing conditions of the Site and surrounding structures.

4. Claims determined to be resulting from pre-existing structural and/or cosmetic damage, not identified during the pre-construction survey, will be the responsibility of the Contractor.

E. Schedule of Permits:

1. Submit a schedule of applicable permits including approximate lead time. Indicate any action items or information required from the Engineer.

2. Submit copies of all supplemental data required by permits with documentation that the supplemental data was provided to the entity that issued the permit according to the schedule required by the permit.

3. Submit copies of complete permit applications to the Engineer prior to submittal to the regulatory entity.

4. Submit copies of fully executed permit applications and final permits to the Engineer.

F. IRM Contingency Plan:

1. Prepare the IRM Contingency Plan (IRMCP). This plan will describe the provisions required for responding to Site-related emergencies that could potentially occur during the Work. The IRMCP will, at a minimum, present the following components:

   a. A spill response plan (SRP) for addressing spills that occur on Site during remedial construction activities. The SRP will describe the methods, means, and facilities required to prevent soil, water, structure, equipment, and material impacts caused by spills; provide information regarding spill containment and cleanup, and provide information related to decontamination measures.

   b. Procedures that Contractor’s personnel will take in response to an emergency;

   c. Designation of an emergency coordinator;

   d. Include a current list of all emergency equipment and evacuation plans;

   e. Procedures for monitoring weather emergencies and discussion of how weather conditions and notifications will impact Site operations.

   f. Procedures and routes for emergency vehicular access/egress;

   g. Procedures for the evacuation of personnel from the Site;

   h. A listing of contact personnel with phone numbers that, at a minimum, includes fire officials, ambulance service, local, county, and state police, local hospitals, a spill response team, and

   i. Routes to local hospitals, including written directions and a map that depicts the location of the Site relative to the hospital(s).

G. Site Operations Plan:

1. Prepare a narrative discussion and drawings describing the means and methods that will be used to execute the Work as detailed in the Contract Documents. The final design will be based on the requirements, intent, and concepts contained in the Contract Documents and will incorporate recommendations from NYSDEC. Scale drawings included in the Site Operations Plan at no less

than 40 feet per inch. At a minimum, the Site Operations Plan will include final submittals with means and methods for the following Project elements:

2. Excavation and backfill phasing plan for performance of the Work.
3. Traffic control plan for equipment delivery. At a minimum, the traffic control plan must include the usage of flaggers and proper signage.
4. Site specific Contractor Quality Control Plan for ensuring the Work objectives are met. This will include a summary of equipment maintenance procedures and contract personnel training requirements.
5. Manufacturer cut sheets for all products requiring approval by the Engineer prior to being incorporated into the Work.
6. Shop drawings.
7. Temporary security fence alignment, gate locations, construction details, and signage.
8. Security procedures and equipment specifications in accordance with Section 01 50 00.
9. Sanitary facility locations.
10. On-Site parking and traffic layout.
11. Off-Site parking locations, if utilized, including routes to and from the Site.
12. Off-Site trucking Subcontractors.
13. Gross level decontamination of delivery vehicle tires and chassis to remove surface soils prior to vehicles departing the Site.
14. Debris management, including proposed disposal facilities.
15. Manufacturers' SDS's and product information for all stabilization agents, such as Cement Kiln Dust (CKD).
16. Staff roles and responsibility summary, including explicit identification of Contractor or Subcontractor staff and qualifications, and who will personally perform and be responsible for the following tasks:
    a. Site health and safety.
    b. Quality control.
    c. Construction documentation.
    d. For each company performing one of the above roles, include company contact information (address, telephone number, facsimile number, website, etc.). For each person identified in the Site Operations Plan include resume with license number for surveyors and engineers.

17. Crew size and equipment list for major tasks.
    a. Identify all major equipment and the swing and tipping radius associated with each piece of equipment. Identify physical controls to be implemented to ensure equipment does not enter the railroad track offset or foul the tracks.
18. Site Operations Plan may be submitted in parts, so long as all parts are submitted by the submittal deadline. Organize for use in the field and for review. Site Operations Plan will be reviewed for both technical content and organization. Include table of contents, technical sections and subsections, appendices (tables, drawings, data, etc.), etc.

H. Borrow Source Evaluation:

1. Submit a borrow source evaluation for each material type that will be incorporated into the Work.
2. Refer to Specification Section 31 23 00 – Excavation and Fill for details on the required components of the borrow source evaluation submittal.

I. Excavation Support Design:

1. Submit an excavation support design that has been prepared and stamped by a Professional Engineer licensed to practice in the State of New York.
2. Incorporate staging of the excavation support into the narrative of the Contractor means and methods included in the Site Operations Plan.
3. Refer to Specifications Section 31 41 00 – Shoring for details on the required components of the excavation support design submittal.

J. Utility Survey:

1. Contact New York 811 to perform a utility markout.
2. Conduct a utility survey, including at a minimum the use of ground penetrating radar (GPR), of the excavation area using a private utility locating service and markout all suspected utility locations. Confirm all suspected utility locations with the utility provider prior to beginning intrusive activities.
3. Provide copies of all one call numbers/tickets/utilities plates/private utility location information to the Engineer prior to beginning intrusive activities. The Engineer will maintain copies on-Site in a clearance package.

1.9. DAILY REPORTS

A. Prepare a daily report summarizing the staff and equipment used and the Work performed each Day and anticipated Work for the next Day. The daily report should also list all daily quantities applicable to pay items listed on the Project Price Schedule. The Contractor’s internal documentation used for this purpose may be used to fulfill this requirement, subject to approval by the Construction Manager. At a minimum the daily report will include the following additional items:

1. Description of any QC testing performed and the results.
2. Excavation and backfill rate for each working Day. Submit certified weight tickets for material exported for off-Site disposal and for each load of imported backfill material.
3. Estimate of the excavation rate, number of trucks needed for transportation to the disposal facility, and the disposal facility production rate for the next Day.

B. Provide, in an addendum to the Daily Report for the last Day of Work in a week, a weekly dewatering log summarizing the following information at a minimum:

1. Weekly rainfall measured at the Site.
2. Weekly record of water levels within the excavation area.

C. Submit daily report for each working Day by 10 AM of the next Day worked.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 30 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1. SUMMARY

A. This section summarizes the protocol and procedures for the preparation and delivery of required submittals to the Construction Manager and Engineer.

1.2. GENERAL REQUIREMENTS

A. Provide all submittals in hardcopy format directly to the Construction Manager and Engineer in accordance with the schedule and procedures contained in this section and the Supplemental Conditions, unless otherwise noted by the Construction Manager and Engineer.

B. Include calculations, construction drawings, shop drawings, plans, reports, records, photographs, diagrams, and details with submittals where applicable to facilitate the review and/or approval.

C. For all submittals, provide three (3) copies; one (1) to the Construction Manager, one (1) to National Grid, and one (1) to the Engineer, unless otherwise noted by the Construction Manager or Engineer.

D. If directed by National Grid, the Construction Manager, or the Engineer, provide submittals electronically in the format requested (i.e. document file, drawing file, image file, etc.). For electronic drawings, submit an AutoCAD file (2004 thru 2010 release) using e-transmit feature (i.e. include external references, image files, color table file, font file, line file, etc.). Convert all AutoCAD add on data to AutoCAD format. Use descriptive layer titles (not numbers only). Use extensive layer control and use line color by layer and line type by layer. AutoCAD files of Contract Drawings will be available to the Contractor upon request.

E. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and Certifications shall be signed by an officer, or other individual, authorized to sign documents on behalf of that entity. Submittals requiring preparation by an engineer shall be signed and sealed by a Professional Engineer licensed to practice engineering in the State of New York.

F. Schedule submittals to expedite Work. Provide the Construction Manager and Engineer a minimum of 5 working Days, excluding transmittal time, for review.

1.3. SUBMITTAL SCHEDULE

A. See Table 01 33 00-1 Submittal Summary attached at the end of this Section. Submittals are required on the items as described individually in each Section of the Technical Specification.

1.4. SUBMITTAL PROCEDURES

A. Use the submittal numbers assigned in Table 01 33 00-1. For submittals not included in Table 01 33 00-1, use the next sequential number as the submittal number. For revised, use original number and a sequential alphabetic suffix. For multiple submittals with the same submittal number, use the original number with a sequential numerical suffix.

B. Use a cover form for submittals. The cover form will include Project identification, Project number, date, submittal number, submittal description/title, submittal exclusions, special issues, Contractor, Subcontractor, etc.

C. Include drawings and details as appropriate.

D. Use the same units of weights and measures used on all submittals as are used in the Contract Documents.

E. Submit all supplier and Subcontractor submittals.

F. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, are in accordance with the requirements of the Work and Contract Documents.

G. Sign the following certification as part of the Submittal Form.

1. I hereby certify that I have carefully examined the enclosed submittal(s) and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal(s) with other submissions and the work of other trades and contractors, and to the best of my knowledge and belief, the enclosed submittal(s) is/are in full compliance with the Contract Documents, except as follows (enter "NONE" if there are no exceptions).

H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

I. Prepare submittals that are complete and in sufficient detail for ready determination of compliance with the contract requirements.

J. Revise submittals as requested by the Construction Manager or Engineer. Identify all changes made since the previous submission.

K. Submittals not requested will not be recognized or processed.

1.5. SUBMITAL REGISTER

A. Maintain a Technical Submittal Register at the Site including the submittal number, description, date submitted, status, date of approval/rejection in accordance with National Grid Supplemental Conditions.

1.6. SUBMITTAL REVIEW

A. The Engineer will review all submittals solely for the purpose of determining whether the information contained in the submittal conforms to the design concept of the Contract Documents. The Engineer will return the submittals with the following classifications:

- Approved as Submitted: Work may proceed, no exceptions taken.
- Approved as Noted: Work may proceed subject to comments, resubmittal not required.
- Revise and Resubmit: Work may not proceed, resubmittal required for indicated items. Proceed with work on other items subject to comments.
- Rejected: Work may not proceed, resubmittal required. Submittal unresponsive and/or not in conformance with Contract Documents.
- For Information Only. Items not reviewed or items for which no submittal is required.

B. Engineer's review of submittals for conformance with Contract Documents does not relieve the Contractor from responsibility with regard to fulfillment of the terms of the Contract and proper and complete performance of the Work in accordance with the requirements of the Contract Drawings, Specification, applicable permits, as well as the general requirements of the Contract Documents.

C. Engineer's review of submittals does not relieve the Contractor from responsibility for errors or omissions in its designs, details, calculations, analyses, test methods, materials, and it's sole responsibility for means and methods of construction, and safe and successful construction of the Work.

1.7. CERTIFICATES OF COMPLIANCE

A. Execute any certificates required for demonstrating proof of compliance of materials with the requirements of the Contract Drawings and Specifications in three (3) copies.

B. Sign each certificate by an official authorized to certify on behalf of the manufacturing or testing company and provide the name and address of the Contractor, the Project name and location, and the quantity and data, or dates of shipment or delivery to which the certificates apply.

C. Provide the name and address of the testing laboratory and the date or dates of the tests to which the report applies with copies of laboratory test reports that are submitted with certificates.

D. Certifications are not to be construed as relieving the Contractor from furnishing satisfactory material, if, after tests are performed on selected samples, the material is found not to meet the specified requirements.

1.8. INVOICES

A. Submit invoices monthly in accordance with the provisions of the National Grid Terms and Conditions and Supplemental Conditions.

2. Include update of Price Schedule that depicts the total contract value and percentage complete of each task completed within the billing period and completed to date with each invoice.

B. Payment will not be made unless all the proper support documentation has been submitted and approved by National Grid or National Grid's representative.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

SUBMITTAL SUMMARY TABLE 01 33 00-1

Submittal Number	Description of Submittal	Submission Deadline	Referenced Specification Section
PRE-CONSTRUCTION			
1	Critical Path Method Project Schedule	Submitted with Bid, updated weekly during construction	01 30 00
2	Pre-Construction Survey Results	1 week after award	01 30 00
3	Site Operations Plan	1 week after award	01 30 00
4	Contractor Health and Safety Plan	1 week after award	01 30 00
5	Contractor Quality Control Plan	1 week after award	01 30 00
6	Remedial Action Contingency Plan	1 week after award	National Grid Supplemental Conditions; 01 30 00
7	Schedule of Permits	1 week after award	01 30 00
8	Excavation Support Design	2 weeks prior to excavation	31 41 00
9	Borrow Source Evaluations	2 weeks prior to importing fill to the Site	31 23 00
10	Utility Survey	1 week prior to mobilization	01 30 00
11	Permits and Data Submittals	Prior to submittal to agency	01 30 00
12	Final Executed Permits	Upon receipt	01 30 00
13	Disposal Facility Contracts	Prior to excavation	02 61 00
REMEDIATION			
14	Daily Report	10:00 AM of the next work Day	01 30 00
15	Invoices	Monthly	01 33 00
PROJECT CLOSEOUT			
16	Substantial Completion	Work is at Substantial Completion	01 77 00
17	Record Documents	Prior to application for Final Acceptance	01 77 00
18	Utility Repair Confirmation	Prior to application for Final Acceptance	01 77 00
19	Permit Closeout	Prior to application for Final Acceptance	01 77 00
20	Final Acceptance	Work is complete	01 77 00
21	Final Invoice	After Final Acceptance	01 77 00

END OF SECTION 01 33 00

SECTION 01 35 00
HEALTH AND SAFETY REQUIREMENTS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, and equipment and performing all activities as required, conforming to all applicable health and safety requirements needed for the safe completion of the Work.

1.2. SUBMITTALS

A. Prior to mobilization, submit the Contractor's Site-specific Health and Safety Plan (HASP) with documentation of OSHA training and enrollment in medical monitoring for all Site personnel.

B. Prior to engaging in Work activities on-Site, all personnel will review and acknowledge the Contractor's Site-specific HASP.

C. Submit a hot work permit for any welding, torch-cutting, or spark-generating activities.

1.3. REFERENCES

A. Applicable regulations and publications include, but are not limited to, the following:

1. ACGIH, Threshold Limit Values and Biological Exposure Indices (most recent version).
2. ANSI, Emergency Eyewash and Shower Equipment, Z358.1, 1981.
3. ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1, 1979.
4. ANSI, Practices for Respiratory Protection, Z88.2 (most recent version).
5. ANSI, Protective Footwear, Z41.1, 1983.
6. ANSI, Respirator Use Physical Qualification for Personnel, Z88.6, 1984.
7. DHHS, "Manual of Analytical Methods," 3rd edition, Volumes I and II, DHHS (NIOSH) Publication 84-100.
8. DOT Standards and Regulations, 49 CFR 171, 49 CFR 172, and 49 CFR 214.
9. NESHAP (40 CFR 61 Subpart M), National Emission Standards for Hazardous Air Pollutants: Asbestos.
10. NFPA, Flammable and Combustible Liquids Code, NFPA 30 (most recent revision).

11. NIOSH Pocket Guide to Chemical Hazards, DHHS/PHS/CDC/NIOSH, August 2006 (or most recent version).
12. NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, DHHS/PHS/CDC/NIOSH, October 1985.
13. OSHA Code of Federal Regulations, 29 CFR 1910.120, Hazardous Waste Operations (HAZWOPER).
14. OSHA, Title 29 CFR Part 1910, Occupational Safety and Health Standards (particularly 1910.134, Respiratory Protection); Title 29 CFR Part 1926, Safety and Health Regulations for Construction Sites (particularly 1926.1101, Asbestos and 1926.62, Lead).
15. OSHA, Title 49 CFR Part 214, Roadway Workplace Safety.
16. TSCA, 40 CFR 761.
17. USEPA, Health and Safety Requirements for Personnel Engaged in Field Activities, USEPA Order No. 1440.2 and 1440.3.
18. USEPA, Standard Operating Safety Guidelines, November 1984.

B. Except when more stringent requirements are written directly into the Contract Documents, all applicable codes, regulations, and standards have the same force, have the same effect, and are made a part of the Contract Documents by reference as if copied directly into the Contract Documents or as if published copies are bound herewith.

C. Where two or more regulations/documents conflict, the one(s) offering the greatest degree of protection shall apply.

1.4. CONTRACTOR’S RESPONSIBILITY FOR HEALTH AND SAFETY

A. Comply with all applicable Federal, State, and local ordinances, laws, and regulations.

B. The Contractor is responsible for the health and safety of its employees, Subcontractors, suppliers, agents, inspectors, visitors, the general public, and any others associated or interacting with the Contractor and providing labor, goods, or other services on the Site.

C. The Contractor is responsible for emergency planning, notification, and response to all emergencies that may occur during the performance of the Work, including emergencies that may occur when the Contractor is not present at the Site.

D. The Contractor is responsible for daily communication with the CM regarding health and safety issues; however, such communication shall not imply any duty or responsibility on the part of the CM regarding the health and safety of the Contractor’s employees, Subcontractors, suppliers, the general public, nor others.

The CM's responsibility and duty regarding health and safety shall be limited to their employees. Communicate health and safety issues accurately and in a timely manner to allow the CM to take appropriate actions that protect their employees.

E. Designate a SHSO with a minimum of 5 years of experience as a SHSO on uncontrolled hazardous waste sites on projects with a similar or higher level of complexity and scope of work, is 40-hour OSHA Hazardous Waste Operations-trained, and is 8-hour OSHA Supervisor-trained.

F. The SHSO shall always enforce the health and safety requirements for all Contractor personnel on-Site. The SHSO shall ensure that all Contractor personnel, Subcontractor personnel, and visitors follow the Contractor's Site-specific HASP, which includes wearing the designated level of Personal Protective Equipment (PPE).

G. Prior to mobilization and continually throughout the duration of the Work, the SHSO shall inspect the Site to document area-specific and worker-specific protection requirements.

H. After mobilization, the SHSO shall monitor Work activities to document the need for additional worker protection as required based on the Work being performed and action levels specified in the Contractor HASP.

I. The SHSO shall verify that all activities are performed in accordance with the HASP and all Federal, State, and local ordinances, laws, and regulations.

J. In the event of a health or safety risk (as determined by the SHSO, other Contractor personnel, or the CM), stop Work until a method for handling the risk has been determined and implemented through consultation with the CM. Report any health or safety risk resulting in a Work stoppage to the CM.

K. The Contractor is responsible for implementing a behavior-based safety process and providing training, observation, and feedback for Contractor personnel employed at the Site.

L. The Contractor is responsible for the stability of excavations and embankments created as part of the Contractor's Work. Designate one Excavation Competent Person (as defined in 29 CFR Part 1926, Subpart P, Excavations) to inspect and document excavation safety conditions daily and to ensure excavation safety prior to any personnel entering an excavation.

M. The CM reserves the right to remove Contractor or Subcontractor personnel from the Site for observed non-compliance with the Contractor HASP. Such removal of personnel will not be considered as valid grounds for a Change Order or an increase in schedule.

1.5. CONTRACTOR'S HEALTH AND SAFETY PLAN

A. Prepare and submit a Site-specific HASP to the CM prior to the start of the Work. Follow all applicable Federal, State, and local health and safety standards; laws and regulations; and guidelines implemented through, but not limited to, OSHA, NIOSH, ACGIH, and USEPA. Where these references are in conflict, follow the more stringent requirement. The SHSO will enforce the HASP. At a minimum, address the following topics in the Contractor HASP:

1. Names of key personnel and alternates responsible for Health and Safety.
2. A Job Hazard Analysis (JHA) associated with each portion of the Work (i.e., list potential chemical and physical hazards), including but not limited to JHAs for material handling, separation, sizing, stockpiling, loading, transportation, and disposal.
3. Documentation of employee and Subcontractor training and medical certifications as required by OSHA.
4. Language pertaining to known Site contaminants, including but not limited to exposure limits, routes and symptoms of exposure, and exposure prevention.
5. A staff management plan indicating the maximum hours worked on a daily and weekly basis for each proposed staff level with the associated time off.
6. PPE to be used for each of the tasks and operations being conducted as required by the PPE program in 29 CFR 1910.120, 29 CFR Subpart I, and 29 CFR 1926.
7. An air monitoring plan describing the method, type, frequency, locations of air monitoring, laboratories, and type of analysis to be performed at the work area for the purpose of employee safety.
8. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used by the Contractor, including methods of maintenance and calibration of monitoring and sampling equipment.
9. Corrective actions, including upgrades of PPE, based on the monitoring of air and environmental sampling with specific Action Levels identified.
10. Site control measures in accordance with the control program required in 29 CFR 1910.120 and 29 CFR 1926.
11. Include decontamination procedures for personnel, vehicles, and equipment in accordance with Toxic Substances Control Act (TSCA) regulations (40 CFR Part 761).
12. If confined space entry is required, include confined space entry procedures in accordance with 29 CFR 1910.146 and a list of all confined space entries anticipated by the Contractor during the performance of the Work.

13. A list of health, safety, and emergency equipment available on-Site with their corresponding locations.
14. A description of engineering controls used to reduce the hazards of equipment operation and exposure to Site-hazardous chemicals.
15. Open trench excavation procedures in accordance with applicable OSHA Regulations, if required.
16. Documentation of training and experience for the designated Excavation Competent Person.
17. Procedures for earthwork near buried and overhead utilities.
18. Training for emergency response procedures.
19. Incident-reporting procedures.
20. Heat stress program.
21. Cold stress program.
22. Lockout/Tagout procedures where the release of stored energy could cause injury to personnel.

B. The Engineer's review of the Contractor HASP does not, in any way, relieve the Contractor of their responsibilities for the health and safety of their workforce.

1.6. NOTIFICATIONS

A. Immediately report the occurrence of all health and safety incidents to the CM. Assist the CM in the preparation of an Accident/Incident Report form, which must be completed within 1 hour of the incident.

B. Immediately and fully investigate any such incident or near-miss and conduct a root cause analysis. Submit the Contractor's written corrective action plan to the CM within 1 day of the incident occurring.

C. Notify the CM, in writing, at least 5 days prior to bringing any hazardous material, equipment, or process to the Site. Provide the CM with an SDS for all chemicals brought onto the Site.

D. Immediately notify the CM, in writing, of any hazard the Contractor discovers or observes on the Site with the corrective measures planned or taken to eliminate or minimize the hazard. Hazard reporting will be completed as a near-miss report.

PART 2 MATERIALS

2.1. EQUIPMENT AND FACILITIES

A. Provide all equipment, temporary facilities, and personnel required to safely perform on-Site activities in accordance with all applicable laws and regulations and with the Contractor's HASP.

2.2. PERSONAL PROTECTIVE EQUIPMENT

A. The Contractor will determine the appropriate level of PPE for the specific tasks, as described in the Contractor's HASP. If hazards are identified that require a level of protection greater than Level C (defined in paragraph D below), suspend Work and notify the CM. The Contractor's SHSO, in consultation with the CM, will determine what corrective actions are required prior to restarting Work. Determine and document the appropriateness of the suggested minimum PPE requirements for Contractor's personnel and others at the Site.

B. Furnish and maintain materials and equipment for the health and safety of the Contractor's employees, Subcontractors, Suppliers, and visitor personnel. Provide all required health and safety equipment, first aid equipment, tools, monitoring devices, PPE, and ancillary equipment needed to ensure workers' health and safety and to comply with the Contractor's HASP.

C. Level D protection will be required at all times for all personnel and visitors on the Site. Level D PPE consists of:

1. Hard hats.
2. Steel-toed boots.
3. Safety glasses with permanent side shields.
4. Work clothes (long pants, shirts with sleeves).
5. Work gloves.
6. High visibility reflective safety vests.
7. Hearing protection (as needed to prevent exposure exceeding 85 dB level).

D. If additional protection consisting of Level C PPE is required during the Work, Level C PPE with Level D protection shall include protection from dust particulates and entrained heavy metals with the following additions:

1. Air-purifying respirator, half-face or full-face (depending on required protection factor) with high efficiency particulate air cartridges that meet NIOSH specifications. The presence of chemical vapors during certain activities (e.g., painting) may trigger the need for additional respiratory protection.
2. Disposable poly-coated chemically protective coveralls.
3. Disposable chemically resistant outer gloves (nitrile).
4. Disposable chemically resistant inner gloves (nitrile).
5. Chemically resistant, steel-toed, and steel-shanked boots (polyvinyl chloride, neoprene, or nitrile) or outer booties.

E. In most cases, Level C will be the maximum level of PPE allowed. Level B may be allowed if personnel are properly trained and certified and if exposure levels are below immediately dangerous to life and health (IDLH) conditions.

2.3. OTHER HEALTH AND SAFETY EQUIPMENT

A. Maintain the following available on-Site equipment for the health and safety of Contractor and Subcontractor staff, suppliers, and visitors:

1. First aid kits.
2. Fire suppression equipment (appropriate to location and type of flammable materials present). Equipment will be certified as ready-for-use within the previous 12 months and will also be inspected each month. Maintain documentation supporting certification and inspections, available for review.
3. Emergency eyewash facilities meeting OSHA specifications.
4. Personnel decontamination facilities and equipment.
5. Flammable liquids storage cabinet(s), if necessary.
6. Personnel air monitoring equipment.
7. Confined space entry equipment, if necessary.
8. Fall protection equipment appropriate for Project hazards.
9. Heavy blankets.
10. Other equipment or supplies determined as necessary or prudent by Contractor or the CM.

PART 3 EXECUTION

3.1. WORKER QUALIFICATION

A. Provide the following training to workers, except those restricted to the Support Zone:

1. Initial 40-hour OSHA Hazardous Waste Health and Safety training and current 8-hour annual refresher training.
2. 8-hour OSHA Hazardous Waste Supervisory training (required for the Contractor's Superintendent and SHSO).
3. Enrollment in a medical monitoring program with clearance from a licensed physician within the previous 12 months that allows the worker to participate in field activities and use respiratory protective equipment.
4. Current respiratory fit testing certification for workers who may be required to work in Level C PPE.

5. Current cardiopulmonary resuscitation (CPR) and first aid certification for at least two workers assigned to Work on the Site.
6. Confined Space Entry Training for workers entering confined spaces.
7. For any worker who is assigned the role of "Competent Person," provide documentation of sufficient, relevant training and experience to perform the assigned duties and responsibilities of that role. As defined in 29 CFR 1926.31, the Competent Person shall be "one who is capable of identifying existing and predictable hazards, and who has authority to take prompt corrective measures to eliminate them."

B. Designate one Competent Person (as defined in 29 CFR Part 1926, Subpart P, Excavations) to inspect and document excavation safety conditions daily and to ensure excavation safety prior to any personnel entering an excavation, if required.

3.2. WORK PLANNING AND MEETINGS

A. Conduct a daily health and safety meeting addressing the day's healthy and safety-related concerns (e.g., changing Site conditions, daily planned activities, etc.) prior to beginning Work for that day. All Contractor and Subcontractor employees working on the Site that day must attend the meeting. Document all meetings and have attendees sign a form acknowledging their presence at the meeting. As part of the daily meeting, include an evaluation of the Work to be conducted, the hazards associated with the Work, and the control measures being used to reduce exposure.

B. Contractor personnel who are not in attendance for the daily health and safety meeting must be briefed on the meeting notes prior to commencing any Work-related activities.

C. Hold and document additional safety meetings at the start of each major task and whenever changes in Site conditions have the potential to affect worker safety.

3.3. ENGINEERING CONTROLS

A. Provide the following engineering controls, as required, to complete the Work and to reduce the hazards of equipment operation and exposure to impacted materials:

1. Rollover cages for bulldozers, back hoes, loaders, and tractors.
2. Backup alarms for moving equipment.
3. Water source with sufficient volume and pressure to reach all areas of the Work. Use the water source for wetting debris, soil, and other media to control dust during the Work.
4. Decontamination of personnel and equipment in accordance with Specification Section 01 50 00 – Temporary Facilities and Controls.
5. Barricades for open trenches and excavations.

6. Bars or cages for cabs of equipment as necessary to resist damage and eliminate risk of injury during material and debris handling.
7. Sloping, benching, shoring, drainage systems, or other controls as necessary to ensure stability of excavations and embankments.
8. Other controls determined to be necessary or prudent by Contractor or as directed by the CM.

3.4. MONITORING

A. Perform heat exposure and cold exposure monitoring activities as required by the current weather conditions.

B. Perform all air monitoring activities described in the Contractor's HASP as required to provide health and safety protection to the Contractor and Subcontractor personnel.

C. A community air monitoring program (CAMP) will be prepared and implemented by the Engineer. The Contractor is solely responsible for work zone air monitoring for their employees.

D. The air monitoring alert and action threshold levels are outlined in the Community Air Monitoring Plan prepared for the Site.

E. Pay all costs associated with sampling and analysis to comply with OSHA regulations.

3.5. EVALUATION OF PERFORMANCE

A. Conduct internal safety audits on work zones in accordance with the Contractor's HASP. The focus of these routine audits is on compliance with the Contractor's HASP.

B. The SHSO is to conduct routine behavioral observations and provide immediate corrective feedback during the performance of the Work to promote the safe behavior of Contractor and Subcontractor employees.

END OF SECTION 01 35 00

SECTION 01 41 00
REGULATORY REQUIREMENTS – PERMITS

PART 1 GENERAL

1.1. SUMMARY

A. This section establishes responsibility for obtaining major Project permits between National Grid, the Engineer, and the Contractor.

1.2. NATIONAL GRID/ENGINEER PERMITS

A. National Grid and/or the Engineer will obtain the following Project permits:

1. Approvals from NYSDEC and/or NYSDOH, excluding approvals of Contractor submittals required by NYSDEC and/or NYSDOH.

1.3. CONTRACTOR PERMITS

A. Obtain the following Project permits in accordance with the Terms and Conditions:

1. Local building, construction, stockpiling, and demolition permits, if necessary.
2. Permits required for temporary access entrances off of public roads, if necessary.
3. Permits required for parking and traffic restrictions on public roads, if necessary.
4. Local variances for temporary fence installation, if necessary.
5. Permits required for temporary lane closures and sidewalk closures, if necessary.
6. Any other permits required for the Work.

B. This Section does not describe all permits required for performance of the Work. Any permits not identified in this Section, or elsewhere in the Contract Documents, are the responsibility of Contractor.

C. Regardless of who is responsible for obtaining a permit, the Contractor is responsible for performing in accordance with the terms and conditions of all permits.

D. Provide any technical and equipment related data required for the Engineer to obtain the necessary permits.

1.4. COORDINATION/ASSISTANCE

A. National Grid and/or the Engineer will coordinate delivery of Contractor submittals to NYSDEC and/or NYSDOH, as required.

B. Provide all data requested by National Grid or the Engineer required to support permit applications. When necessary, National Grid and/or the Engineer may provide data summaries or other Project information to the Contractor in support of Contractor data submittals.

C. Any coordination and/or assistance between National Grid and the Engineer are provided in the interest of expediting the Project. Provision of coordination and/or assistance does not relieve the Contractor of any obligations regarding the timeliness and completeness relative to the permit submittals.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 41 00

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, equipment, supplies, laboratory testing, materials, and performing all operations required for providing temporary facilities and controls during the performance of the Work.

1.2. MATERIALS

A. All materials will be suitable for their intended use and conform to applicable codes and standards.

B. Provide appropriate first aid supplies in accordance with all applicable and relevant Federal, State, and local regulations.

C. Provide hand carried, portable, UL rated, Class ABC, dry chemical extinguishers or a combination of extinguishers of NFPA recommended classes for the exposures. Provided fire extinguishers at all temporary facilities, workstations, trailers, and offices. Keep detailed records of maintenance and expiration dates.

D. Provide a sufficient number of self-contained, single occupancy toilets with chemical flush, aerated re-circulation, which are properly vented and fully enclosed with fiberglass or other nonabsorbent material. At a minimum provide two single occupancy toilets outside of the exclusion zone. Designate one toilet as "Women Only".

E. Provide fully equipped hand wash stations outside of toilets and in the personnel decontamination area.

F. Provide separate, dedicated, temporary construction office space and workstations for the Engineer, Construction Manager, CAMP technician, National Grid representative, and the NYSDEC representative. At a minimum provide a furnished construction trailer to include electricity, 2 telephone lines, air conditioning, and heat. Each workstation will include a desk, chair, separate telephone for each work station, facsimile, and internet services.

G. Designate two on-Site parking spaces for the exclusive use of the Engineer, Construction Manager, and National Grid.

H. Provide and maintain a sufficient supply of materials/equipment required to implement decontamination procedures, including, but not limited to, the following items:

1. Plastic trash barrels
2. Liners for trash barrels
3. Wash basins

4. Alconox™ or approved equivalent detergent concentrate
5. Hand pump sprayers
6. Long handled soft bristle brushes
7. Large sponges
8. Cleaning wipes for respirators
9. Bench or stool(s)
10. Stepladder(s)
11. Steam generator
12. Liquid detergent and paper towels
13. Plastic trash bag
14. Supplies and equipment to construct the decontamination pad
15. All necessary hosing, connection, etc. to collect and transport decontamination fluids to the wastewater treatment system.

I. Install temporary fencing at the locations shown on the Contract Documents.

1. Temporary fencing must be at least 8 feet in height, and firmly secured to withstand wind and prevent unauthorized access.
2. Cover both temporary and permanent fence with opaque privacy fabric around the entire work area for the duration of the IRM.
3. Existing fencing on the Site is shown on the Contract Drawings. Protect this security fencing from damage and repair and replace fencing damaged by Contractor's activities.
4. Furnish, install, and maintain all other proposed temporary fencing, gates and barriers around impacted areas as required by the Contract Documents and to complete the Work.
5. Furnish and post signs at every entrance and gate, and at not less than every 50 feet along the fence warning the general public that the Site contains physical and chemical hazards, and that access is forbidden to unauthorized persons.
6. Furnish and affix the NYSDEC MGP remediation sign that meets standards of the NYSDEC template.
7. Furnish and post a professionally lettered sign, of a minimum size of 4 feet by 4 feet, at each entrance, or gate to the Site with the following text, or other similar text approved by the Engineer.

"All Personnel and Visitors Beyond This Point Must Wear Hard Hat, Safety Glasses, High-Visibility Vest, and Steel Toe Boots."

J. Provide Rusmar AC 645 Long Duration foam or Engineer approved equivalent. Provide a foam application unit with a minimum capacity and flow rate equal to or in excess of the RUSMAR PFU 400/25

PART 2 MATERIALS

(Not Applicable)

PART 3 EXECUTION

3.1. GENERAL

A. Operate and maintain all equipment and systems to ensure that that the temporary facilities, controls, utilities, other services, etc. are provided without disruption.

B. Design, furnish, install, and maintain all temporary Site facilities and controls required for the performance of the Work.

C. Maintain vegetation in a neat and trimmed manner during the Work.

D. Provide and maintain all temporary environmental controls as necessary for protection of the environment throughout the performance of the Work.

E. Provide and maintain proper barricades and warning signs at all closures, holes, hazards, and equipment areas.

F. Ensure that all Subcontractors comply with the provisions of this Specification.

3.2. SANITARY FACILITIES

A. Empty the sanitary facilities before the capacity is exceeded, or on a weekly basis, whichever occurs first. Clean sanitation facilities concurrently with emptying.

B. Clean and restock hand wash stations as needed.

3.3. TEMPORARY UTILITIES

A. Provide water suitable for decontamination for the duration of the Project.

B. Supply potable drinking water for on-Site personnel.

C. Provide all temporary utility services (electric, internet, heat, air conditioning, etc.) in accordance with this Specification for the duration of the Project. This includes, but is not limited to installation, operation, maintenance, and removal of all equipment and/or systems required to assure uninterrupted service, and all charges associated with installation, connection, service, and shut-off.

D. The use of existing on-Site utilities on all other private properties is prohibited.

3.4. PERSONNEL DECONTAMINATION

A. Comply with all requirements of the Site-Specific Contractor Health and Safety Plan.

B. Provide the means for National Grid, the Construction Manager, and the Engineer, to comply with Site Specific Contractor Health and Safety Plan.

C. Provide a personnel decontamination station within the Work Zone where personnel can drop equipment and remove personal protective equipment (PPE).

1. Equip decontamination station with basins for water and detergent and trash bags or cans for containing disposable PPE and other discarded materials.

2. Supply a sink as a secondary means of personal hygiene for personnel.

3.5. EQUIPMENT DECONTAMINATION

A. Install decontamination equipment in accordance with the Contract Drawings.

1. Decontamination pad will be located and operated at any point that equipment leaves the Site.

2. Decontamination pad will be sufficiently sized to ensure the largest piece of equipment can be adequately decontaminated.

B. Remove heavy contamination using a broom and/or brushes within the excavation area prior to movement to the decontamination pad.

C. Perform heavy equipment decontamination within the limits of the decontamination pad.

D. Pressure wash heavy equipment before leaving the Site, if necessary.

E. Decontaminate any equipment utilized to excavate impacted materials prior to backfilling.

F. Collect and pump wastewater from equipment decontamination into frac tanks.

G. Collect and remove soils from the decontamination pad and bulk with excavated materials.

3.6. NOISE CONTROL

A. Conform to the local noise ordinance for the Town of Islip at all times.

1. Applicable sections of the Town of Islip City code are excerpted below:

a. § 35-3. Prohibited Noises

3.6.A.1.a.1. Heavy equipment. The operation of any pile driver, bulldozer, pneumatic hammer, grinder, noise or other construction equipment which creates a noise disturbance, except between 7:00 a.m. and 8:00 p.m. on weekdays and except in cases of urgent necessity in the interest of public safety.

3.6.A.1.a.2. Construction. Any construction, excavation, demolition, alteration or repair which creates a noise disturbance, except between 7:00 a.m. and 8:00 p.m. on weekdays and except in cases of urgent necessity in the interest of public safety.

B. Measure the noise level at Project limit as needed. Provide noise barrier or apply for ordinance to exceed noise limit, as needed.

C. Equip vehicles and motorized equipment with appropriate noise control devices to maintain noise levels that conform to current OSHA standards and current State and local regulations. Immediately take steps to correct any deficiencies noticed or as directed by National Grid and/or the Engineer.

D. Properly maintain all mufflers and noise control devices and replace when necessary. Operate all construction equipment in the manner that it was intended. Excessive amount of noise and vibration due to improper use of vehicles and equipment is prohibited.

E. All equipment that is required to operate beyond standard Site work hours will, to the maximum extent possible, be electrically driven.

F. Do not conduct Work outside of the permitted working hours (Monday through Friday, 8:00 am to 4:00 pm, no work on Federal holidays) without advanced approval.

3.7. EQUIPMENT LEFT ON SITE

A. Secure all vehicles and/or equipment left on the Site outside of the standard work hours.

B. Ensure that all equipment, where feasible, is de-energized when left on-Site and not in use to prevent electrical/fire/explosive hazards. Contractor will be responsible for security, operation and maintenance of any systems that require such services outside standard work hours. If systems are operational outside the standard work hours, provide oversight at all times when equipment is in operation or provide an electronic monitoring system with remote communication ability in the event of system failure. Repair system failures such that the Project schedule is not affected.

3.8. SITE SECURITY

A. Take every security precaution necessary to prevent any unauthorized access to the Work area, and to control construction traffic to and from the Site.

B. Provide manned security service 24-hours per day, 7-days a week for the duration of the IRM.

C. Establish written Site security procedures as part of the Site Operations Plan. At a minimum the procedures will include:

1. Roles and responsibilities of personnel involved with Site security.

2. Description of proposed daily security operations.
3. Method and frequency for conducting security checks.
4. Sign in/sign out procedures.
5. Location of security station.
6. Description of how a breach of security will be handled. A breach of security includes, but not be limited to, unauthorized personnel located on the Site working area, unauthorized personnel attempting to gain access to the Site working area, broken fences and unlocked gates, and unauthorized personnel in the hazardous work zones.
7. Communications.
8. List of personnel to be contacted in case of emergency.

3.9. ENVIRONMENTAL PROTECTION

A. For the purposes of this specification, environmental protection is defined as the retention of the environment in its natural state to the greatest extent possible during construction and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air, water, and land resources and involves noise, solid waste management, and management of other pollutants. Comply with all applicable or relevant and appropriate Federal, State, and local laws to provide for abatement and control of any environmental pollution arising from the construction activities in performance of the Work.

B. The Construction Manager and/or Engineer may notify the Contractor in writing of any non compliance with Federal, State, and/or local laws. After receipt of the notice, immediately inform the Engineer of the proposed corrective action and take such actions, if they are approved by the Engineer. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order suspending or halting all or parts of the Work until satisfactory corrective action has been taken. Claims for extensions of time, or for excess costs or damages by the Contractor due to the stop orders described above, will be denied.

C. Do not pollute any stream, river, waterway, roadway, or soil with fuel, oil, grease, lubricant, hydraulic fluid, bitumen, calcium chloride, acid, base, or other harmful materials. Comply with the appropriate Federal, State, and local regulations and guidelines for the handling and disposal of all materials.

D. Properly dispose any debris resulting from the performance of the Work. Disposing of any debris, soil, water, effluent, by product, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, or other harmful material etc., in or adjacent to the Project area is not acceptable. Remove any unauthorized dumped materials and restore the area as directed by the Engineer. If necessary, contaminated areas as a result of unauthorized activity or dumping by the Contractor will be remediated or excavated at no additional cost.

E. Dispose of all contaminated materials (debris, soil, water, effluent, by-product, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, used erosion controls, or other harmful material etc.) resulting from the Work in accordance with all applicable or relevant and appropriate Federal and State laws prior to completion of construction.

3.10. DUST, ODOR and VAPOR CONTROLS

A. Apply odor-suppressing foam to the soil stockpiles, excavation, loading operations, or any other Site operation as directed by the Construction Manager or Engineer.

B. Provide labor, equipment, and material required to apply odor and vapor suppressant foam to all exposed soil areas including stockpiles within 5 minutes when directed by National Grid, the Construction Manager, or the Engineer. No separate payment will be made for the supplying and operation of vapor/odor control equipment. Payment for vapor/odor suppression materials will be per the bid unit price. Failure to apply vapor/odor suppression materials within the specified time will result in all Contractor operations being suspended until such time as the Engineer feels the request for controls has been fully satisfied by the Contractor, and no additional payment for such downtime will be due to the Contractor.

C. Maintain sufficient material on hand, to apply foam as directed, when intrusive Work or soil handling is being performed.

D. All exposed areas and stockpiles left untouched for greater than 2 hours are to be covered with a secured polyethylene tarp. Provide an equivalent covering for all soil stockpiles left on-Site overnight. Utilize vapor suppression to cover stockpiles during the stockpiling and loading of soil. Foam application must begin within 10 minutes of creation of the stockpile or the beginning of loading activities, and continue until stockpile activities are completed. At which time the pile will be covered with polyethylene sheeting, and secured.

E. Provide dust control using water trucks, hoses, or engineered dust suppression materials.

END OF SECTION 01 50 00

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1. SUMMARY

A. Project completion covers the administrative and technical requirements for final cleaning, inspection, Project as-built documents, warranties, bonds, final payment, and other procedures for project closeout in accordance with the National Grid Terms and Conditions.

1.2. CLOSEOUT PROCEDURES

A. Substantial Completion:

1. When the Contractor considers the Work or designated portion thereof to be at Substantial Completion, provide written notice, with a list of items to be completed or corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. The Engineer will inspect to determine the status of completion.
3. Should the Engineer determine that Work is not Substantially Complete, the Engineer will notify Contractor in writing.
4. The Contractor will within two (2) days of the notice provide a schedule for when all defects will be corrected and/or the Work completed for the Engineers review.
5. Upon the Engineer's approval, remedy any deficient and/or incomplete Work and upon completion, notify the Engineer. The Engineer will re-inspect the Work for the purpose of Final Acceptance.

B. Project As Built Drawings:

1. Submit record surveys in electronic format and provide 8 hard copies to the Engineer. Record surveys include:
   a. Encountered structures left in place,
   b. Encountered pipes not removed and cut/capped pipes,
   c. Utility locations, elevations, and inverts,
   d. Bottom of remedial excavation,
   e. Backfill grade,
   f. Final Grade; and
   g. Benchmark coordinates and elevation

C. Provide copies of all Project records including:

1. Manifests and bills of lading
2. Weight tickets
3. Testing results
4. Health and Safety reports
5. Copies of permits

D. Utility Relocation

1. Submit written confirmation from the utility providers that all temporary relocated utilities have been restored to pre-remediation condition and that all temporary utility connection points have been restored to a suitable condition.

E. Permit Closeout

1. Submit written confirmation that all permits have been closed with their governing authority and that any and all remaining fees have been paid in full.

F. Final Acceptance

1. Submit written certification that confirms the following: Contract Documents have been reviewed, Work has been inspected, Work is complete in accordance with the Contract Documents including satisfactory compliance with performance guarantees, any previously noted deficiencies have been corrected or remediated, equipment has been tested in presence of the Engineer, and Work is complete and ready for final inspection.
2. Submit evidence of final continuing insurance coverage, complying with insurance requirements, with the application for final payment.
3. The Engineer will inspect Work to verify status of completion.
4. Should the Engineer consider the Work to be incomplete or defective, the Contractor will be notified in writing identifying incomplete or defective Work.
5. Take immediate action to remedy incomplete and deficient Work and send written notice when Work is complete. The Engineer will re-inspect Work to verify status of completion.

G. Final Payment

1. Submit applicable for final payment after the final acceptance of the Work.
2. Identify total Contract amount, previous payments and the amount due.

PART 2 MATERIALS

(Not Applicable)

PART 3 EXECUTION

3.1. POST CONSTRUCTION INSPECTION

A. Prepare the Site for Substantial Completion and Final Acceptance. Work includes record documents, cleaning the Site and administrative provisions.

B. After final cleaning and upon written notice from the Contractor that Work is complete, the Engineer will make a preliminary inspection. The Engineer will notify the Contractor in writing of defective and/or incomplete Work by generating a "punch list."

C. Upon receiving written notice from the Engineer, remedy defects and/or incomplete Work to the satisfaction of the Engineer at no additional cost in a time frame suitable to support the Project schedule.

D. Inform the Engineer in writing after the items listed in the "punch list" are corrected or completed. Upon receipt of notice, Engineer will make final inspection of the Project in the presence of the Contractor.

E. Should the Engineer find the Work to be satisfactory, the Contractor will be allowed to make application for final payment in accordance with provisions of the Agreement. Should the Engineer still find deficiencies and incomplete Work, the Contractor will be notified in writing of deficient and/or incomplete Work and requests for final payment will not be approved until such time that the Contractor has satisfactorily completed the required Work.

END OF SECTION 01 77 00

SECTION 02 21 00
SURVEYS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required for performing surveying Work.

B. This section details the surveying requirements for the performance of the Work.

1.2. QUALIFICATIONS

A. Subcontract with a Professional Surveyor licensed in the State of New York to serve as the independent surveyor for the Project.

B. The selected surveyor may not be replaced unless the Contractor submits a written request to National Grid for approval that details the reason(s) for the requested change and includes any noted deficiencies.

1.3. REFERENCE POINTS

A. Established horizontal control points and benchmarks, as needed. Protect the reference points from disturbance during performance of the Work.

B. When laying out and controlling the performance of the Work, use horizontal and vertical datum's that are consistent with those used in the Contract Drawings (NGVD-1929, NAD 1983).

1.4. TERRESTRIAL SURVEY

A. Provide topographic survey, as needed, to control the Work and collect the information required to create the Record Drawings as detailed in Specification Section 01 77 00 – Closeout Procedures.

B. At the conclusion of the Work, provide an ALTA level survey of the Site that meets the requirements of DER-33 / Institutional Controls: A Guide to Drafting and Recording Institutional Controls.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1. TERRESTRIAL SURVEY PERFORMANCE

A. Promptly report to the Engineer the loss or destruction of a reference point.

B. Perform the terrestrial survey Work using a total station with the following measurement tolerances:

1. Horizontal: +/- 0.05 feet.

2. Vertical: +/- 0.01 feet.

C. Keep a complete and accurate log of all survey and control work. Maintain a copy of the log on-Site at all times.

D. Survey crews must comply with all requirements of the Contractor Health and Safety Plan.

END OF SECTION 02 21 00

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the partial or complete removal, storage, and/or disposal or salvage of structures, at grade, above grade, and below grade during performance of the Work.

1.2. SUBMITTALS

A. Submit monitoring well decommissioning records to National Grid and the Engineer.

PART 2 MATERIALS

A. (Not Applicable)

PART 3 EXECUTION

3.1. GENERAL

A. Demolition of pavement and/or any related structures, as part of the IRM, must be carried out in accordance with State of New York Department of Transportation-Standard Specifications, Section 200.

B. Remove existing pavement, concrete pads, portions of existing fencing, structures and appurtenances from the Site as detailed in the Contract Documents.

C. At the direction of the Engineer abandon monitoring wells shown in the Contract Documents in accordance with the NYSDEC CP-43 Groundwater Monitoring Well Decommissioning Policy, dated November 3, 2009.

3.2. DEBRIS HANDLING

A. Store demolished materials on a debris pad, or in a container designed for the purpose.

B. Dispose of any debris in accordance with the Contract Drawings and Section 02 61 00 – Removal and Disposal of Contaminated Materials.

3.3. DEMOLITION OF REMNANT STRUCTURE AND ABANDONED PIPES

A. Where structures are partially demolished, employ means (saw cutting, pre-splitting, etc.) to maintain the integrity of the portion of the structure to remain in place.

3.4. ON-SITE CRUSHING

A. On-Site crushing will not be allowed.

END OF SECTION 02 41 00

SECTION 02 61 00
REMOVAL AND DISPOSAL OF CONTAMINATED MATERIALS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required for the proper management, off-Site transportation, and disposal of waste materials and waste liquids generated during implementation of the IRM.

1.2. GENERAL

A. The National Grid list of approved disposal facilities for the receipt of each waste stream for the Project Site are included with the Contract Documents.

1.3. SUBMITTALS

A. Designate and submit primary and alternate thermal desorption receiving facilities, liquid waste treatment facilities, and landfill receiving facilities for materials (soils, liquid waste, and bulk waste). Upon final approval from National Grid, contract with all facilities prior to any excavation. Copies of contracts from each facility or letters from each facility indicating acceptance of the total estimated volume of material from this Project will be submitted to the Engineer.

B. Submit copies of all waste manifests, bills of lading, and certified weight slips from a scale approved for use by the Engineer and/or National Grid for all materials removed from the Site for disposal.

C. Submit copies of Part 364 Permits for all waste transporters.

PART 2 MATERIALS

2.1. VEHICLE REQUIREMENTS

A. Vehicles used for the transport of materials shall be structurally sound and watertight to prevent leakage or spillage. All trucks must have the floor and side walls of the truck bed lined with plastic prior to loading with impacted materials. All trucks must be equipped with solid tarps. Trucks equipped with mesh tarps are not permitted. All trucks must have a gasket seal on the back truck gate (that is in serviceable condition) and all tarps should have a flap (in serviceable condition, with proper grommets and holes) that covers the back top gap of the truck that can be secured via bungee cord or other Engineer approved methods. If trucks are not equipped as such, plastic must be placed on top of the soils before the tarp is lowered so that soils and/or odors that might escape from the back of the truck are minimized and the material is protected from rain during transit.

B. Properly affix license plates on the truck and remain visible at all times.

C. Display proper placards and cover or remove extraneous or incorrect placards prior to the truck departing the Site.

D. Display or have required permits readily available for verification by the Construction Manager. The Construction Manager reserves the right to reject vehicles that are not properly permitted to transport waste materials from the Site to the approved disposal facility.

E. Drivers must remain in the truck at all times unless they are wearing the correct personal protective equipment required for the Site.

F. The Construction Manager reserves the right to reject vehicles that are not properly equipped and/or require the use of plastic sheeting if the gasket seal and flaps are not considered by the Construction Manager or National Grid to be in serviceable condition.

2.2. IMPACTED MATERIAL STORAGE

A. Vehicles and storage containers utilized for the storage and/or transport of impacted materials will be structurally sound and tight to prevent leakage or spillage of materials.

B. Vehicles and containers utilized for the storage and/or transport of materials will be provided with solid sealable covers to minimize the release of odors from the containers during transport.

C. Provide impermeable liners for the interior of the excavated impacted material storage containers and vehicles to prevent leakage of entrained liquid. The liner material will be strong enough to withstand the placement of excavated material into the container without tearing, and chemically resistant to the contaminants within the material.

2.3. ODOR SUPPRESSANT

A. Odor and dust suppressing foam will be provided to supplement covers, as directed by the Construction Manager.

PART 3 EXECUTION

3.1. LOADING AND TRANSPORTATION OF MATERIAL

A. Trucks must arrive on-Site clean. The Construction Manager may instruct a truck to depart the Site if it arrives in a dirty condition.

B. Do not stand on the back of the truck. Use ladders or scaffolding when securing tarps and/or covers.

C. Collect waste characterization samples that meet the requirements of the selected disposal facility prior to mobilization to allow direct load, transport, and disposal of all MGP-related impacted material.

D. Provide traffic control at the Site entry to ensure a smooth flow of traffic and to minimize congestion at the Site entrance. At a minimum, the traffic control must include the usage of dedicated flaggers and proper signage.

E. Appropriately cover trucks (see Section 2.1) filled with excavated material prior to exiting the Site to prevent vapor and fugitive dust emissions during transport. Supplement with odor suppressant foam or solvent as needed. Gross vehicle truck weights shall conform with the most current DOT regulations for the Federal, State, and local level.

F. All Work in and around trucks shall be performed in appropriate personal protective equipment. These activities must be specifically addressed in the Site Specific Contractor HASP.

G. Prior to leaving the Site, inspect all material transport vehicles and containers for evidence of contamination (including inside of wheels and undercarriage). All trucks leaving the Site shall proceed to a decontamination station for cleaning prior to exiting onto public roads.

1. Brush off equipment using a broom and/or brushes within the excavation area prior to movement to the decontamination pads to decrease the amount of respirable particulates leaving the remediation area.

2. If necessary, at the decontamination pad, all heavy equipment will be pressure washed before leaving the Site.

3. All equipment leaving the Site will be decontaminated per these guidelines. In addition, any equipment previously utilized to excavate impacted material will be decontaminated prior to use in backfilling (e.g. excavator bucket).

4. Size decontamination pads to ensure that the largest piece of Contractor equipment can be adequately decontaminated. Provisions will be made to control overspray at the decontamination pads.

5. Collect and pump wastewater from equipment decontamination into frac tank(s).

6. Wastewater will be transported from the Site by a properly licensed liquid waste hauler.

7. Soils collected from the decontamination pads will be bulked with the MGP-related impacted material and sent to the properly licensed National Grid-approved disposal facility, as necessary.

H. Trucks shall proceed directly to the designated thermal desorption facility.

I. The Contractor is responsible for any and all actions necessary to remedy situations involving material spilled or leaked in transit, or mud or dirt tracked off-Site. This includes trucks carrying imported fill or other materials to the Site (i.e. dust generated from trucks entering the Site on adjacent roads). Clean up shall be performed in accordance with all applicable Federal, State, and local regulations at no additional costs to National Grid.

J. All transporters used shall be properly licensed, permitted, and certified for the service provided.

K. Material from the Site will not be combined with any other material, without the Engineer's approval.

L. National Grid, the Construction Manager, or the Engineer will sign transport bills of lading or manifests. National Grid will provide a hazardous waste generator number, if required. Maintain copies of all documents involving transportation of materials from the Site. Copies of these records shall be submitted to the Engineer at a frequency agreed to by the Contractor and National Grid. All records shall be turned over to National Grid at the completion of the Work.

M. Ensure that transport vehicles are properly secured, labeled, and placarded prior to exiting the Site.

3.2. DISPOSAL OF MATERIALS

A. Dispose of soils that contain MGP-related impacted material at an off-Site licensed disposal facility approved by National Grid, unless otherwise specified.

B. Dispose of debris to an off-Site licensed landfill receiving Construction & Debris facility approved by National Grid, unless otherwise specified.

C. The Contractor is responsible for the acceptance of materials at the facilities. In the event that the identified and approved facilities cease to accept the materials, the Contractor will be responsible for identifying alternate facilities, and making arrangements with such facilities to accept material from the Site with no change in the unit price submitted in the Contractor's Bid for this Project. Alternate facilities are subject to review and approval by National Grid.

D. In the event that an alternate facility is needed to accept the material, the Contractor will supply a written submission to National Grid on the material type, amount, location, and reason the approved facility ceased to accept the material. Alternate facilities not previously audited by National Grid will require an audit prior to allowing transport of materials to the facility. Any charges or fees incurred by the Contractor associated with delays to the Project schedule during this audit process are the responsibility of the Contractor.

E. If any materials are encountered during excavation that appear to exhibit hazardous characteristics these materials should be segregated, stored on Site, sampled, and disposed of appropriately.

F. The Contractor is responsible for ensuring MGP-impacted soils are homogeneous and without deleterious materials, such as construction debris, that would cause rejection of the materials by the disposal facility. Any costs association with delays caused by rejected materials are the responsibility of the Contractor.

G. Decontaminate construction debris and/or bulky material within the excavation, if encountered, if possible.

H. Segregate non-contaminated construction debris and bulky wastes for transport to a landfill facility.

I. Dispose of decontamination wastewater at an off-Site liquid waste treatment facility approved by National Grid.

J. Solid material collected in the dewatering frac tank(s), as a result of settling in the tank, shall be bulked with the suspected MGP-related impacted material and sent to the thermal desorption facility and/or landfill as necessary.

END OF SECTION 02 61 00

SECTION 31 09 00
GEOTECHNICAL INSTRUMENTATION

PART 1 GENERAL

1.1. SUMMARY

A. The Engineer will oversee a geotechnical instrumentation program consisting of vibration monitoring during the performance of the Work.

PART 2 MATERIALS

2.1. VIBRATION MONITORS

A. The Engineer will furnish two (2) Minimate Plus vibration monitor with geophone attachments from Instantel, or National Grid approved equivalent, for use during the performance of the Work.

PART 3 EXECUTION

3.1. PROTECTION

A. Protect all instruments from damage due to construction operations, weather, traffic, and vandalism.

B. The Contractor is liable for all costs associated with the replacement of instruments that are damaged as a direct result of their actions or the actions of their Subcontractors.

C. Conduct no Work within 30 feet of damaged instrumentation until the instrument is repaired or replaced, as needed.

3.2. VIBRATION LIMITS

A. Conduct all Work in such a manner that vibrations caused by the Work do not damage nearby structures.

B. Do not allow vibration levels at the adjacent structures to exceed the guidance criteria set forth by USBM RI 8057, excerpted in the table below.

Frequency, Hz	Maximum Safe Particle Velocity value (in/s)
1, 2, 3, 4	0.18, 0.36, 0.54, 0.75
4 – 14	0.75
14, 20, 30, 40	0.75, 1.0, 1.4, 2.0
40 – 100	2.0

C. The guidance provided in the USBM maximum safe particle velocity values table does not relieve the Contractor from responsibility with regard to fulfillment of the terms of the Contract and the requirement to protect the existing structures and restore or replace damage caused either directly or indirectly during the performance of the Work.

D. National Grid may instruct the Contractor to implement vibration reduction strategies in order to mitigate vibration levels which exceed the USBM criteria during the performance of the Work.

E. Requests for an increase in time or relevant pay items related to the implementation of any vibration reduction strategies needed to meet the requirements of this Section will be denied.

3.3. DATA ACQUISITION

A. The recording of vibration data will be performed by the Engineer, if required.

B. Provide safe access to all Engineer controlled instrumentation equipment located on-Site.

END OF SECTION 31 09 00

SECTION 31 10 00
SITE PREPARATION

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the Site preparation prior to performance of the IRM.

1.2. SUBMITTALS

A. Provide the New York 811 ticket number and the findings of the utility mark out to National Grid and the Engineer prior to excavation.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTIONS

3.1. GENERAL SITE PREPARATION ACTIVITIES

A. Clear all debris, rubble, and vegetation from the Work areas and in any other areas which will be used for construction support as approved by the Construction Manager.

B. Clear all debris, rubble, and vegetation from the air monitoring station locations as directed by the Construction Manager and/or Engineer.

C. Provide protection for existing monuments, structures, and appurtenances during the Work.

D. Provide protection and security for air monitoring station locations during the Work.

E. Provide temporary relocation of appurtenances that have the potential to become damaged during performance of the Work.

3.2. UTILITY PROTECTION

A. Contact the New York 811 Call Center to request that all utilities on the Site are located and marked. Ensure that the utility mark out is refreshed as necessary, as directed by New York 811, or at the direction of National Grid or the Engineer.

B. Retain the services of a private underground utility location company to mark out the locations of underground utilities in the areas of planned excavation on private property.

C. Any underground utility protection will be the responsibility of the Contractor prior to and during any excavation activities.

D. Hand dig when the depth of location of utilities is uncertain.

E. Repair any utilities damaged as a result of the Work.

3.3. TEMPORARY CONSTRUCTION ENTRANCE

A. Obtain the appropriate permits required for temporary construction entrances, if necessary; refer to Section 01 41 00.

B. Install the temporary construction entrance in accordance with any Town of Islip requirements.

3.4. DEBRIS REMOVAL

A. Remove debris within the limits of Work area, and debris generated during the demolition of the asphaltic and concrete surfaces; handle, screen and characterize as necessary.

B. Remove all debris (i.e. trash, metal, concrete, asphalt, etc.) within the Site boundary. Conduct all handling, segregating and screening activities that are necessary to facilitate off-Site disposal.

C. Contaminated materials must be segregated from non-contaminated materials and prepared, as necessary, for disposal at the facilities approved for use during performance of the IRM.

D. Dispose of all debris at an approved disposal or recycling facility.

END OF SECTION 31 10 00

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the excavation, handling, backfilling, and dewatering of material during performance of the IRM.

1.2. SUBMITTALS

A. Excavation and Backfilling Plan: Submit Excavation and backfilling plan showing sequencing, staging, and phasing of the excavation and backfill activities. Incorporate into Site Operations Plan submittal described in Section 01 31 00 – Administrative Requirements.

B. Borrow Source Evaluation: Submit the results of the borrow source evaluation for each source to be used as imported clean backfill indicating the material is in compliance with the geotechnical and environmental criteria. Perform borrow source evaluation prior to the import of fill from the borrow source. Include the following:

1. Name, address, telephone number, facsimile number, and web site address of borrow source.
2. Certificate of clean fill from the borrow location stating that the soil is native in origin and free of contamination.
3. Analytical results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is free of contamination and in compliance with the clean fill environmental criteria.
4. Geotechnical test results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is in compliance with the clean fill geotechnical criteria.

PART 2 PRODUCTS

2.1. GENERAL

A. A stabilization agent, such as cement kiln dust (CKD), or equivalent to amend soils too wet to transport in trucks must be provided, as necessary. The stabilization agent used must be acceptable to the disposal facility and in accordance with NYSDEC requirements for amendments. Provide National Grid, the Construction Manager, and the Engineer the manufacturer MSDS and product information for all amendments prior to being imported to the Site.

B. Odor Suppressing Foam

1. Provide a Rusmar foam (or Engineer approved equivalent) unit of sufficient size (minimum of a Rusmar PFU400/25 unit) that is capable of covering the areas containing impacted soil within 5 minutes on the Project Site, for the duration of the excavation.

2. Provide sufficient odor suppressing foam to cover excavations and impacted soils in truck beds. Foam must be water based, white, and unscented.

2.2. BACKFILL

A. Gravel Fill

1. Furnish Gravel Fill that consists of hard, durable particles of fragments of stone. Materials that break up when alternately frozen and thawed or wetted and dried will not be used. Utilize Gravel Fill that meets the following gradation requirements, or equivalent as approved by the Engineer.

U.S. Standard Sieve	Percent Finer by Dry Weight
1.0 inch	100
3/4 inch	90 to 100
0.5 inch	10 to 50
3/8 inch	0 to 20
No. 4	0 to 5

B. Clean Fill

1. Furnish Clean Fill that conforms to material designation 304-1 Type 4 in the Standard Specification prepared by the New York State Department of Transportation that has a pH greater than 5 and less than 10. Utilize Clean Fill that is free of organic matter, and meets the following requirements:

U.S. Standard Sieve	Percent Finer by Dry Weight
2 inch	100
0.25 inch	30 to 65
No. 40	5 to 40
No. 200	0 to 10

C. Stabilized Gravel Surface Course

1. Furnish the Stabilized Gravel Surface Course (Blue Stone) on a prepared base in accordance with these specifications and meets the following gradation requirements, or equivalent, as approved by the Engineer.

U.S. Standard Sieve	Percent Finer by Dry Weight
2 inch	100

0.25 inch	30 to 65
No. 200	10 to 20

2. Particles passing the No. 40 sieve size shall have a maximum liquid limit of 30 and a plasticity index ranging from 3 to 8. The maximum loss in 4 cycles of the Magnesium Sulfate Soundness Test shall be 30. If the gravel as obtained from the bank is deficient in any of the requirements specified, such deficiency shall be corrected by screening, processing and/or blending with other acceptable materials before stockpiling. The requirements of (stockpiling section) shall apply to all gravel furnished for this work.

3. When the in-place material is of uniform consistency and has a moisture content within the limits for proper compaction, as determined by the Engineer, it shall be thoroughly compacted by the use of self-propelled pneumatic tired or vibratory compactor in accordance with the requirements in these specifications. During the compaction operation, light grading shall be done as required to maintain the surface of the course true to grade and cross-section. In confined areas, inaccessible to rollers, mechanical rammers shall be used to obtain the compaction required in this specification. The finished surface of the stabilized gravel course shall be rolled in a float of free watcher with a smooth steel wheeled roller weighing not less than 10 tons. In all cases, the material must be so thoroughly compacted that it will not displace under the roller.

D. Environmental criteria sampling is not required for material from a New York State Department of Transportation approved source provided that NYSDOT virgin source certification and the most recent analytical results are provided to National Grid for approval in advance of importing the fill.

E. If from a non-NYSDOT approved source, sample at a frequency in accordance with DER-10. Analyze backfill samples for Pesticides, TAL Metals, PCBs by EPA Method 8082, PFAS by draft EPA Method 1633, VOCs by EPA Method 8260B or NYSASP Method 95.1, and SVOCs and 1,4 -dioxane by EPA Method 8270C or NYSASP Method 95-2. Soils must meet the Residential Use Criteria as listed in DER-10, Appendix 5.

2.3. DEMARCATION BARRIER

A. Furnish a high visibility, orange, polypropylene snow fence. Other high visibility or florescent colors may be used upon approval from the Engineer.

B. Use underground warning tape that is non-detectable, high visible polyethylene tape of a different color than the demarcation barrier. Print warning text in Spanish and English “Danger - Do Not Dig - Peligro no Excavar.” The warning may be printed directly on the demarcation barrier.

PART 3 EXECUTION

3.1. CAMP REQUIREMENTS

A. Implement airborne dust and vapor suppression measures required to comply with the CAMP and as directed by National Grid, the Construction Manager, or the Engineer. These actions may include any of the following or other measures to minimize air emissions:

1. Applying water on exposed soil surfaces and/or roadways to suppress dust.
2. Covering working areas of exposed soils or stockpiles with tarpaulins, vapor suppressing foam, or other vapor controls.
3. Modifying the means and methods of the Work (i.e. using different or additional equipment, etc.).
4. Modifying the production rate (i.e. excavation rate, etc.).
5. Changing the sequence of activities

3.2. EXCAVATION

A. Perform excavations in accordance with OSHA regulations.

B. Perform the excavation to the lines and grades indicated on the Contract Drawings.

C. Manage excavated materials in accordance with the Section 02 61 00 – Removal and Disposal of Contaminated Materials. Excavated material handling includes:

1. Excavate subsurface soil to contours, elevations, and dimensions indicated.
2. Whenever possible, perform the excavation as a direct load operation.
3. Transport and dispose of all excavated material at a regulated, licensed, and National Grid-approved thermal desorption facility.
4. Segregate bulk solid waste and construction debris encountered during excavation.
5. Separate the construction debris and solid waste within the limits of the excavation. Soil should be gravity dewatered such that the water is allowed to drain back into the excavation.

D. Perform all excavations using proper shoring and bracing and/or excavation sloping/benching to ensure slope stability.

E. The excavation portion of the Work will be above and below the water table. Perform the excavation below the water table using techniques to minimize the water content of the excavated soil such that they can be transported in trucks without stabilization or other special measures. Measures will include the use of slotted or perforated buckets to allow water trapped in the bucket drain back to the excavation. If needed, use short term stockpiling within the excavation to allow excavated soil to drain as space and equipment allow. Use stabilization only for soils that are inherently too wet and cannot be dried sufficiently using other techniques. Stabilization may only be used with the approval of National Grid and/or the Engineer.

3.3. BORROW SOURCE EVALUATION

A. Perform borrow source evaluation for geotechnical and environmental criteria to ensure that the imported material meets the project criteria.

3.4. BACKFILL

A. Furnish imported clean backfill material.

1. Install the demarcation barrier at the vertical limits of the excavation. Place the warning tape at 5 ft on center intervals
2. Backfill the portion of the excavation below the water table with Gravel Fill.
3. Place a nonwoven geotextile filter fabric over the Gravel Fill to separate from subsequent levels of fill to be placed above. Overlap geotextile filter fabric a minimum of 6 inches on both sides.
4. Backfill over the Gravel Fill with Clean Fill up to 4 inches below the final restoration grade.
5. Install 4-inch thick Stabilized Gravel Surface Course to establish final restoration grade.
6. Do not place backfill without the approval of the Engineer. Placement of backfill prior to Engineer approval is at the Contractor's risk and may require removal at the Contractor's cost. Commence backfill placement and compaction upon confirmation of the horizontal and vertical limits of the excavation; whichever is applicable, and as directed by the Engineer.
7. Dewater the excavation as necessary to remove excess water during backfilling operations and to prevent a surface release of groundwater. Ensure that groundwater within the excavation does not overtop the excavation support system or excavation walls during backfill operations.
8. Prior to placing backfill above the groundwater table, collect and dispose of residual NAPL within the excavation limits in accordance with Specification 02 60 00

B. Backfill excavations in accordance with the Contract Drawings.

C. Place backfill using a method that does not cross contaminate backfill, or disturb/damage adjacent structures and property.

D. Place and compact backfill in maximum 12-inch lifts.

E. Maintain moisture content within +3 to –3 percent of the backfill optimum moisture content to attain required compaction density.

F. For Gravel Fill, place in maximum 12-inch lifts and compact using the back of the excavator bucket to the satisfaction of the Engineer, prior to placing the subsequent lift of material.

1. Perform laboratory and field geotechnical testing.

2. Compact the clean fill backfill to the percent of the maximum dry density (as determined by Modified Proctor during the borrow source evaluation) indicated in the table. Do not place overlying lifts of backfill until in place compaction tests indicate that the current grade layer has been compacted in accordance with this criterion.

Project Area	**Percent Compaction (%)**	**Test Frequency (per lift of material)**
Less than 2 feet Below Finished Grade	95	50 ft by 50 ft
Greater than 2 feet Below Finished Grade	92	50 ft by 50 ft

3. Utilize an appropriately licensed testing Subcontractor that is certified to test soil by ASTM D6938-latest edition, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods-Shallow Depth.

G. Dewater as necessary to allow for backfill placement. Dewatering shall be minimized and limited to only remove water that would be displaced from the excavation at grade.

H. Field Control Quality

1. If compaction testing indicates that the Work does not meet the specified requirements, provide additional compaction or remove the soil and replace with acceptable backfill.

2. The Engineer reserves the right to reject backfill that differs visually from the identified source material and to randomly test backfill materials for conformance with the specifications. Remove backfill that fails to meet the specifications

3.5. CONSTRUCTION METHODS

A. Establish excavation rates that will permit continuous Work while accommodating the receiving capacity of the selected treatment/disposal facilities.

B. Due to limited space, materials will be excavated as a direct load operation whenever possible.

C. Divert or otherwise prevent surface water from entering excavations to the greatest extent practicable without causing damage or flooding to adjacent properties.

END OF SECTION 31 23 00

SECTION 31 25 00
EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, equipment, supplies, laboratory testing, materials, and performing all operations required for providing erosion and sediment controls during the performance of the Work.

B. Ensure that all subcontractors comply with the provisions of the specifications.

1.2. EROSION AND SEDIMENT CONTROLS

A. Implement and maintain a Sediment and Erosion Control Plan in accordance with, but not necessarily limited to, the Contract Drawings.

B. Storm water runoff shall be controlled as required for the control of erosion and sedimentation and as required to prevent the discharge of storm water off-Site, which has come into contact with stockpiled soil.

C. Storm water shall be diverted/routed away from temporary facilities, excavations, stockpiles, and management pads to minimize potential contact with excavated soil and to prevent storm water runoff from entering the excavation and temporary facilities.

D. In areas of concentrated vehicular traffic (such as the site access/egress points, vehicle storage or staging areas), exposed soil or pavement surfaces shall be wetted with water as necessary to prevent the release of airborne dust. Perform watering to the extent required to prevent dusting of adjacent properties and streets.

E. Public streets, shall be free of dirt, dust, contaminated materials, or other building/construction materials associated with the Work. If such materials are deposited, spilled, leaked, or spread on off-Site roadway, immediately remove such material.

1.3. CONTROL OF POLLUTANTS OTHER THAN SOIL/MUD/DUST

A. All pollutants that occur on the Site during construction shall be handled and disposed in a manner that does not impact stormwater runoff.

B. Fueling of Contractor’s equipment, to the extent practicable, shall be performed away from storm drain inlets and catch basins.

PART 2 PRODUCTS

2.1. GENERAL

A. All furnished materials must be suitable for their intended use and conform to applicable codes and standards.

B. Install erosion controls at the locations shown on the Contract Documents.

2.2. STRAW BALES

A. Straw bales and stakes: Refer to New York State Department of Transportation Standard Specifications Section 209.

PART 3 EXECUTION

3.1. GENERAL

A. Provide and maintain all erosion controls, as necessary for protection of the environment, throughout the performance of the Work.

B. Conduct operations to minimize erosion of soils and to prevent silting and muddying of lands adjacent to or affected by the Work

C. Ensure that all Subcontractors comply with the provisions of this Specification.

3.2. EROSION CONTROLS

A. Install and maintain the erosion controls as depicted on the Drawings. Install additional silt fence and straw bales as needed and as directed by National Grid and Engineer.

B. Installation of erosion and sedimentation controls prior to commencing intrusive Work.

C. Maintain erosion and sedimentation control measures until final stabilization of the site has been achieved.

D. Implement additional temporary sedimentation and erosion control measures deemed appropriate by the Engineer.

3.3. STORMWATER RUN-ON/RUN-OFF CONTROL

A. Intercept stormwater and divert it away from excavations and Work areas through use of dikes, ditches, curb walls, pipes, sumps, or other National Grid-approved means. This requirement includes temporary measures as required to protect adjoining properties from surface drainage caused by construction operations.

B. Prevent stormwater run-on/run-off from transporting materials off-site. Any stormwater coming into contact with contaminants shall be containerized and sent off-site for disposal. Minimize the amount of water requiring transport or treatment.

C. All control measures necessary for stormwater management are the Contractor’s responsibility. Should, in the opinion of National Grid, the Contractor fail to provide adequate run-on controls, all costs related to the collection, storage and disposal of the resulting impacted storm water shall be the responsibility of the Contractor.

3.4. INSPECTION AND MAINTENANCE

A. Inspect erosion controls on a daily basis during the work. Repair any deficiencies immediately. Maintain records of the inspections at the site in a log book. Log book will be available for review by National Grid, the Engineer, or the NYSDEC upon request.

B. Inspection and repairs shall be conducted immediately after rain or flooding events, and at least once each day during prolonged rain events.

C. Remove sediment deposits and place them in designated spoil areas. Do not allow sediments to migrate off-site. If sediment has been in contact with contaminated materials, it shall be incorporated into material to be disposed, or further characterized to determine appropriate disposition.

D. Immediately repair damage to erosion and sediment control systems, as directed by National Grid.

3.5. STREET SWEEPING

A. Sweep the truck haul route on a weekly basis.

B. Perform additional street sweeping as directed by National Grid during the performance of the Work.

3.6. STOCKPILE MANAGEMENT

A. Manage stockpiles in accordance with Sections 01 50 00 – Temporary Facilities Controls.

3.7. DUST MANAGEMENT

A. Manage dust in accordance with Sections 31 23 00 – Excavation and Fill.

END OF SECTION 31 25 00

SECTION 31 41 00
SHORING

PART 1 GENERAL

1.1. SUMMARY

A. Provide all labor, equipment, supplies, and materials to install, operate, maintain, and remove a temporary excavation support system in the locations indicated on the Contract Drawings.

B. Utilize information provided within the bid documents to determine the means, methods, and pricing of the Work.

1.2. EXCAVATION SUPPORT SYSTEM DESIGN CRITERIA

A. The Contractor is responsible for the design, materials, methods, and phasing of construction, subject to the criteria provided in the Contract Documents.

B. Design the excavation support system in accordance with industry standards, soil and groundwater conditions at the Site, and the concepts and criteria on the Contract Drawings. Criteria are intended as guidelines for design and are to be regarded as a minimum.

C. Design the excavation support system to support earth pressures, hydrostatic pressures, construction equipment loads, building loads, and other surcharge loads as appropriate. Design the excavation support system to allow safe and expeditious excavation and backfill.

D. Design the excavation support system based on allowable movements that will not damage nearby structures, utilities, roadways, and other features.

E. Design the excavation support system to allow excavation to a depth of two feet deeper than the target elevations indicated on the Contract Drawings without any change in the support system as installed.

F. Refer to Specification Section 31 09 00 – Geotechnical Instrumentation for information details on instrumentation requirements.

1.3. SUBMITTALS

A. Excavation support design submittals shall be stamped by a Professional Engineer licensed to practice in the State of New York.

B. Submit a complete excavation support system design that includes the following:

1. Soil properties and design assumptions.

2. Pre-cut depths and limits.

3. Requirements for the setback of surcharge loads.

4. Load diagrams with force combinations acting on the system at each excavation stage.
5. Phasing diagrams.
6. Complete drawings showing all materials, locations, layouts, sizes of members, details, connections and methods, and sequence of installation and removal of the excavation support systems.
7. Complete engineering computations and design assumptions for all parts and stages of the excavation support system.
8. Movement estimates, including an explanation of why the estimated movements are protective of nearby structures, utilities, roadways and other features

C. After installation submit a detailed as-built plan of the excavation support system. Include steel member identification, size, location, length, top elevation, excavation level/stage, and any other pertinent data. Include joint details. Indicate modifications, if any, to the design.

D. Submit an action plan for arresting any unforeseen movements which could damage nearby structures, utilities, roadways and other features. Include methods and time for implementation.

E. Provide a plan for the backfilling of the void space created by the removal of the excavation support system. Include details for the materials and methods that will be utilized during this process.

PART 2 PRODUCTS

2.1. MATERIALS

A. Use materials suitable for their intended use and that conform to applicable codes and standards.

B. All structural steel members used shall conform to AISC standards.

C. Utilize welding technique and welding electrodes that are in accordance with AWS D1.1, Structural Welding Code, latest edition.

D. Use steel shims or wedges, wooden shims or wedges are not permitted.

2.2. INSTALLATION EQUIPMENT

A. Size installation equipment to provide sufficient energy to install the excavation support system.

B. Size removal equipment to provide sufficient energy to remove the excavation support system.

PART 3 EXECUTION

3.1. GENERAL

A. Install the temporary excavation support system in order to excavate and backfill the excavation area shown in the Contract Drawings.

B. Install, maintain, and remove the excavation support system in a manner that prevents the following:

1. Excessive movement and settlement.
2. Removal of soil fines from the adjacent ground.
3. Damage to or excessive movement of nearby structures, utilities, roadways and other features.

C. Implement the setback of surcharge loads outside of the excavation as required by the design.

3.2. INSTALLATION

A. Install steel support members in a plumb position in the locations shown on the excavation support system design.

B. If the excavation support system is unable to be installed as designed due to unforeseen field conditions, cease installation and notify the Construction Manager and the Engineer.

C. Maintain accurate records of the excavation support system installation. Include type of steel member, detailed installation record, final elevation, deviations from design location and alignment, lateral deflection and settlement measurements, and all other data pertaining to the installation and performance. Permanently mark/stamp/tag each steel member with a reference number above the ground surface.

3.3. MOVEMENT

A. Monitor the performance of components of the excavation support system for vertical and horizontal movements and for the overstressing of structural members.

3.4. REMOVAL

A. Design excavation support system to be removed. Remove all components of the system, after the excavation and backfill has been completed as specified in the Contract Documents.

B. Remove the excavation support system and abandon the void space in accordance with all applicable state and local regulations.

END OF SECTION 31 41 00

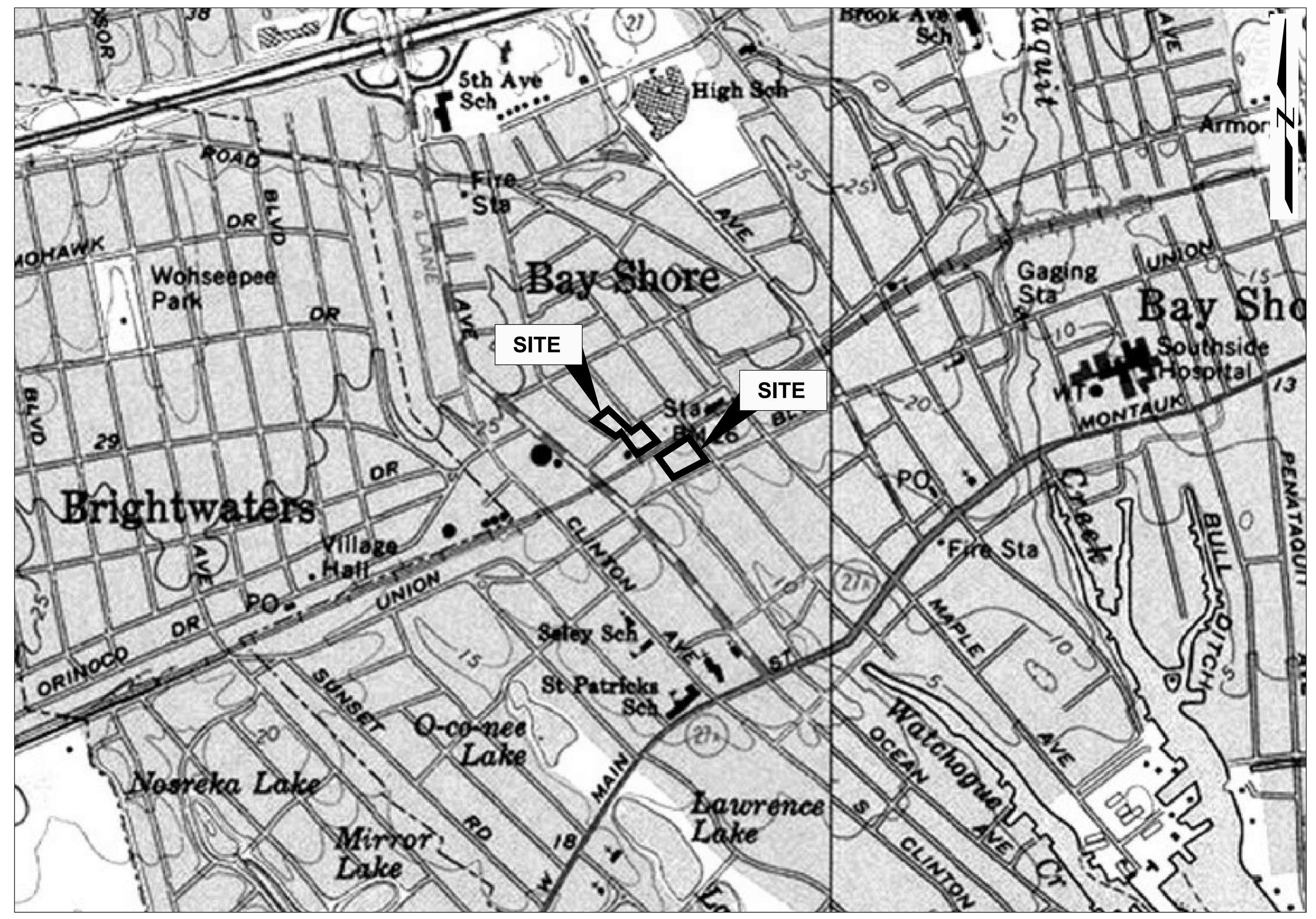
INTERIM REMEDIAL MEASURE

BAY SHORE FORMER MANUFACTURED GAS PLANT SITE
OPERABLE UNIT NO. 4 - 22 OAK STREET EXCAVATION
SUFFOLK COUNTY, TOWN OF ISLIP, NEW YORK

SOURCE:
U.S.G.S. TOPOGRAPHIC MAPS, 1:24,000, BROOKLYN, NY, 1995 AND JERSEY CITY, NJ, 1981. MAP CREATED WITH TOPO! ® ©2001 NATIONAL GEOGRAPHIC (www.nationalgeographic.com/topo).

REGIONAL MAP

0 1 2
SCALE, MILES



SOURCE:
USGS TOPOGRAPHIC QUADRANGLES BAY SHORE EAST, NY, 1979 AND BAY SHORE WEST, NY, 1979. MAP CREATED WITH TOPO! ® ©2001 NATIONAL GEOGRAPHIC (www.nationalgeographic.com/topo)

SITE LOCATION

0 1000 2000
SCALE, FEET

SCHEDULE OF DRAWINGS

Dignet of NEW YORK CITY & LONG ISLAND
800-272-4480 | 811
811 Know what's below. Call before you dig.
811 Determina lo que está bajo tierra. Llama antes de excavar.
1-800-962-7962
(WWW.DIGSAFELYNEWYORK.COM)

PREPARED FOR:

NATIONAL GRID
175 EAST OLD COUNTRY ROAD
HICKSVILLE, NEW YORK

GEI Consultants
110 WALT WHITMAN ROAD, SUITE 204
HUNTINGTON STATION, NY 11746

PROJECT NUMBER: 093180-4-1418

MARCH 2023

Not for Construction

Attention:				
0 1"				
If this scale bar does not measure 1" then drawing is not original scale.	2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
	1	6/6/2023	DRAFT - FOR REGULATORY SUBMITTAL	***
	NO.	DATE	ISSUE/REVISION	APP

DRAFT

Designed:	ES
Checked:	JP
Drawn:	JLD
Submitted By:	MJO
P.E. Number:	091317

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Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

DWG. NO. 1

DRAWING INDEX

SHEET NO. 1 OF 9

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LEGEND:

- PROJECT LIMIT
- EXISTING STRUCTURE
- HISTORICAL STRUCTURE
- PROPERTY LINE
- CHAIN LINK FENCE
- WOODEN FENCE
- 19.5 MINOR GROUND SURFACE CONTOUR
- 20 MAJOR GROUND SURFACE CONTOUR
- TREE
- UTILITY POLE
- SLOTTED MANHOLE
- STORM MANHOLE
- SANITARY MANHOLE
- GUY WIRE
- GV GAS VALVE
- WV WATER VALVE
- LIGHT POLE
- GAS METER
- "A" INLET CATCH BASIN
- "B" INLET CATCH BASIN
- UTILITY CLEAN OUT
- VAULT
- BOLLARD
- G GAS UTILITY MARKOUT
- W WATER UTILITY MARKOUT
- E ELECTRIC UTILITY MARKOUT
- O.H. OVERHEAD WIRES
- EDGE OF PAVEMENT
- CURB
- SAN SANITARY SEWER PIPE
- STORM SEWER PIPE
- SEPTIC TANK APPROXIMATE LOCATION
- WCMW-18WT, S, I, I2 MONITORING WELL AND GROUNDWATER SAMPLE LOCATION WT=WATER TABLE, S=SHALLOW, I AND I2=INTERMEDIATE, D=DEEP
- IW-10 S-ISCO INJECTION WELL VAULT
- MPGL-7 S-ISCO APPLICATION GAS LINE MONITORING POINT
- SB-I8 PREVIOUS SOIL BORING
- PDI-1 PRE-DESIGN INVESTIGATION SOIL BORING (PRIOR TO BUILDING DEMO)

Not for Construction

SOURCES:

1. SURVEY TITLED "TOPOGRAPHIC SURVEY, SECTION 366, BLOCK 4, LOT 39, TOWN OF ISLIP, COUNTY OF SUFFOLK, NEW YORK" BY KS ENGINEERS, P.C., 494 BROAD STREET, NEWARK, N.J. 07102, DATED 12-06-10.

0 20 40
SCALE, FEET

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NO.	DATE	ISSUE/REVISION	APP
2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
1	6/6/2023	DRAFT - FOR REGULATORY SUBMITTAL	***

DRAFT

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Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

EXISTING CONDITIONS PLAN

DWG. NO. 2

SHEET NO. 2 OF 9

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LEGEND:

- PROJECT LIMIT
- PROPERTY LINE
- TEMPORARY FENCE
- HAY BALES / SILT FENCE
- ANTI-TRACKING PAD
- EXCAVATION LIMITS
- LAYDOWN AND STORAGE AREA
- TRAFFIC FLOW DIRECTION

SITE MANAGEMENT NOTES:

1. LOCATION AND SIZES OF THE SITE MANAGEMENT FEATURES SHOWN ARE CONCEPTUAL. ACTUAL SIZE AND LOCATION TO BE BASED ON CONTRACTOR'S MEANS AND METHODS.
2. PERFORM WORK BETWEEN 8 AM AND 4 PM UNLESS AUTHORIZED BY NATIONAL GRID OR CONSTRUCTION MANAGER.
3. LIMIT NOISE TO 80 dBA AT PROJECT LIMIT. MEASURE NOISE LEVEL AT PROJECT LIMIT, AS NEEDED. PROVIDE NOISE BARRIER OR APPLY FOR ORDINANCE VARIANCE TO EXCEED NOISE LIMIT.
4. PROVIDE A MINIMUM OF TWO SANITATION FACILITIES INSIDE THE SUPPORT ZONE. CLEAN WEEKLY OR ACCORDING TO USE, IF MORE FREQUENT. IDENTIFY ONE FOR MALES AND ONE FOR FEMALES.
5. CONTRACTOR SUPPORT ZONE AND SITE PERSONNEL VEHICLE PARKING WILL BE LOCATED ON OU-1 NORTH.
6. INSTALL PHYSICAL CONTROLS TO ENSURE EQUIPMENT AND MATERIALS DO NOT FOUL OR RISK FALLING ONTO THE TRACKS, IN ACCORDANCE WITH THE GENERAL REQUIREMENTS OF LIRR.

DECONTAMINATION NOTES:

1. ALL PERSONNEL EXITING EXCLUSION ZONE MUST PASS THROUGH THE CONTAMINANT REDUCTION ZONE.
2. ALL VEHICLES EXITING THE EXCLUSION ZONE MUST PASS THROUGH THE CONTAMINANT REDUCTION ZONE. USE EQUIPMENT DECONTAMINATION PAD AS REQUIRED BY THE CONSTRUCTION MANAGER, AND NYSDEC. CONTROL OVER SPRAY.

PERIMETER FENCE NOTES:

1. INSTALL PERIMETER FENCE AROUND PROJECT LIMITS. UTILIZE EXISTING CONCRETE BARRIER WALLS AND FENCING WHERE AVAILABLE.
2. HEIGHT = 8 FEET MINIMUM.
3. MAINTAIN A MINIMUM OF ONE ACCESS GATE. PROVIDE TEMPORARY LIGHT AT ACCESS GATES, AND OTHER AREAS AS REQUIRED.
4. USE FABRIC PRIVACY SCREENING TO DEFLECT ODORS UP.
5. COVER FENCE WITH PRIVACY SCREEN (UV TREATED/STABALIZED FABRIC) TO FUNCTION AS A VISUAL AND WIND BARRIER.
6. INSTALL LOCKS ON ALL GATES. MAINTAIN KEYS ON SITE. PROVIDE NATIONAL GRID, CONSTRUCTION MANAGER, AND ENGINEER COPIES.
7. DESIGN FENCE POST EMBEDMENT DEPTH, SPACING, AND DIAMETER TO ACCOMMODATE PRIVACY SCREEN AND FENCE HEIGHT.

SECURITY NOTES:

1. INSTALL SECURITY MEASURES PRIOR TO START OF WORK.
2. PROVIDE SECURITY PERSONNEL 24 HOURS PER DAY, 7 DAYS PER WEEK.
3. ALL PERSONNEL MUST SIGN IN PRIOR TO ENTERING THE SITE. AT A MINIMUM, RECORD NAME, COMPANY, DATE, TIME IN, TIME OUT, AND REASON TO BE ON SITE.
4. LIMIT SITE ACCESS TO AUTHORIZED NATIONAL GRID, CONSTRUCTION MANAGER, STATE, COUNTY, CITY, ENGINEER, SUBCONTRACTOR, CONTRACTOR STAFF, AND OTHER PERSONNEL AUTHORIZED BY NATIONAL GRID.

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0 10 20
SCALE, FEET

Attention:
0 1"
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NO.	DATE	ISSUE/REVISION	APP
2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
1	6/6/2023	DRAFT - FOR REGULATORY SUBMITTAL	***

DRAFT

Designed:	ES
Checked:	JP
Drawn:	JLD
Submitted By:	MJO
P.E. Number:	091317

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Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
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SITE LAYOUT AND EROSION AND SEDIMENT CONTROL PLAN

DWG. NO.
3

SHEET NO.
3 OF 9

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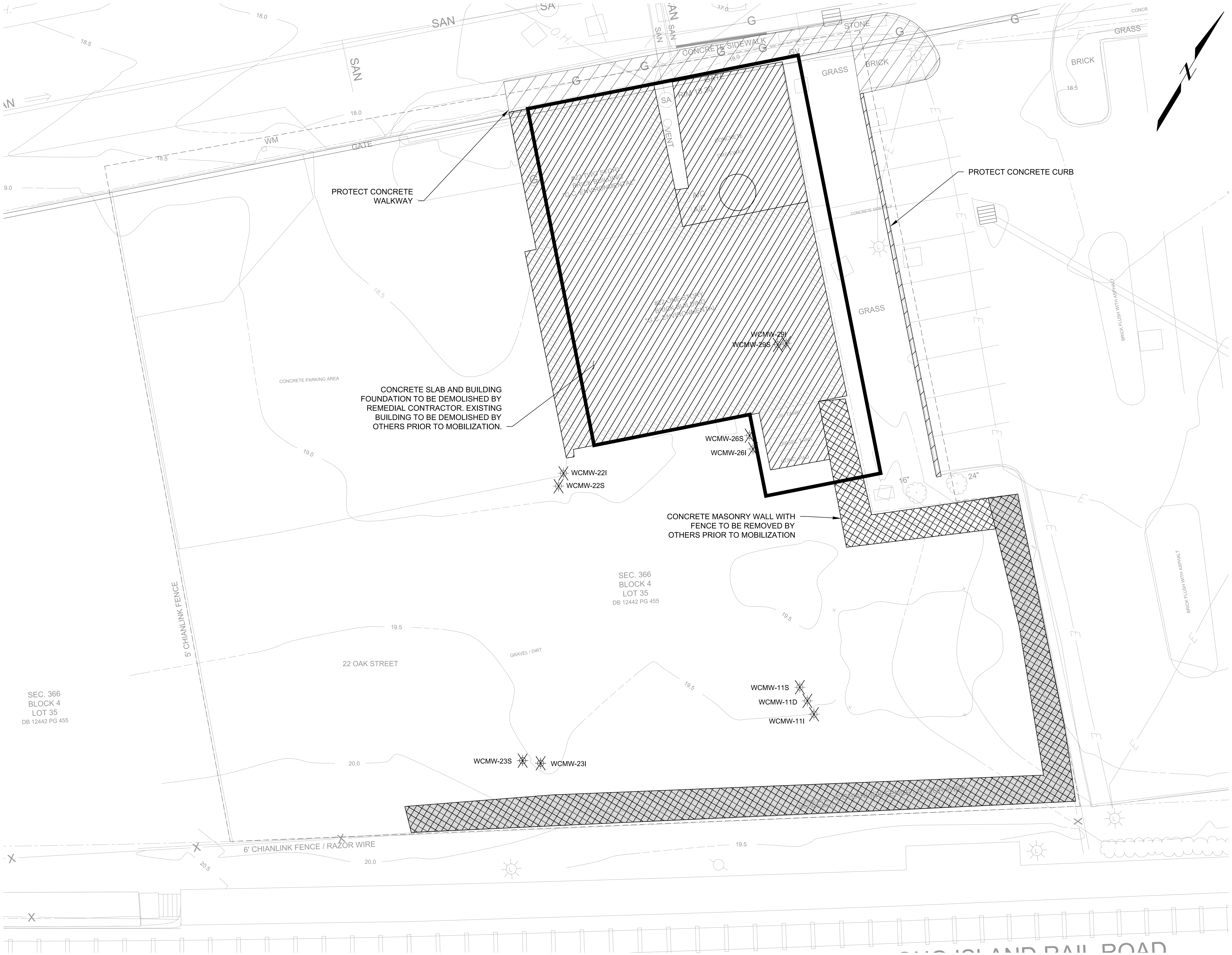

LEGEND:

- PROJECT LIMIT
- TEMPORARY PROJECT LIMIT
- EXCAVATION LIMIT
- PROPERTY LINE
- PROTECT
- WCMW-28I ABANDON WELL / WELL CLUSTER
- G GAS UTILITY MARKOUT
- W WATER UTILITY MARKOUT
- E ELECTRIC UTILITY MARKOUT
- O.H. OVERHEAD WIRES
- SAN SANITARY SEWER PIPE
- STORM SEWER PIPE
- DEMOLISH
- DEMOLISHED BY OTHERS

PROTECTION NOTES:

1. PROTECT WELLS TO REMAIN.
2. PROTECT STRUCTURES TO REMAIN.

DEMOLITION NOTES:

1. DISPOSE OF REMOVED MATERIALS OFF-SITE, AS PER THE PROJECT SPECIFICATIONS. EXISTING ONE STORY BRICK BUILDING, TWO STORY BRICK TO BE REMOVED BY OTHERS PRIOR TO MOBILIZATION.
2. BUILDING FOUNDATIONS, CONCRETE DRIVEWAY, SEPTIC TANK, AND UTILITIES TO BE REMOVED BY REMEDIAL CONTRACTOR.

UTILITY NOTES:

1. EXISTING BUILDING UTILITIES WILL BE DISCONNECTED BY OTHERS PRIOR TO MOBILIZATION. CUT AND CAP UTILITIES AT THE LIMITS OF THE EXCAVATION

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0 10 20
SCALE, FEET

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NO.	DATE	ISSUE/REVISION	APP
3	8/24/2023	DRAFT - REMOVE WELL PROTECTION	***
2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
1	6/6/2023	DRAFT - FOR REGULATORY SUBMITTAL	***

DRAFT

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DEMOLITION AND PROTECTION PLAN

DWG. NO. 4

SHEET NO. 4 OF 9

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LEGEND:

- PROJECT LIMIT
- PROPERTY LINE
- 10 TARGET EXCAVATION DEPTH (FEET)
- REMEDIAL EXCAVATION LIMITS
- DEEP EXCAVATION LIMITS
- EXCAVATION SUPPORT
- A1 EXCAVATION CORNER POINT
- WCMW-18WT, S, I, I2 MONITORING WELL AND GROUNDWATER SAMPLE LOCATION WT=WATER TABLE, S=SHALLOW, I AND I2=INTERMEDIATE, D=DEEP
- IW-10 S-ISCO INJECTION WELL VAULT
- MPGL-7 S-ISCO APPLICATION GAS LINE MONITORING POINT
- SB-I8 PREVIOUS SOIL BORING
- PDI-1 PRE-DESIGN INVESTIGATION SOIL BORING (PRIOR TO BUILDING DEMO)

REMEDIAL EXCAVATION NOTES:

1. DESIGN TEMPORARY EXCAVATION SUPPORT SYSTEMS, AS NEEDED. USE APPROPRIATE DESIGN LOADINGS.
2. EXCAVATE IN WET CONDITIONS. PERFORM THE WORK TO PROMOTE GRAVITY DEWATERING OF WET SOILS BACK INTO THE EXCAVATION.
3. USE CAUTION WHEN EXCAVATING BELOW THE WATER SURFACE. DO NOT ALLOW THE SIDEWALLS OF THE EXCAVATION TO BECOME UNSTABLE.
4. DEMARCATION BARRIER TO BE PLACED AT BOTTOM OF EXCAVATION PRIOR TO BACKFILL.

ODOR, VAPOR, AND DUST CONTROL NOTES:

1. PROVIDE SPRAYED WATER (TRUCK AND/OR HOSES) FOR GENERAL DUST CONTROL. DO NOT USE WATER FROM THE EXCAVATION TO PERFORM DUST CONTROL.
2. APPLY DUST OR ODOR SUPPRESSION AS NEEDED AND/OR AS REQUESTED BY THE ENGINEER OR NYSDEC.
3. CONTROL ODOR USING FOAM (RUSMAR) OR OTHER METHODS AS NEEDED.
4. ADJUST CONSTRUCTION (INCLUDING HALTING OR SUSPENDING WORK) TO COMPLY WITH VAPOR AND DUST ACTION LIMITS AND ODOR ISSUES.

TABLE 1 - EXCAVATION COORDINATES

POINT	NORTHING	EASTING
A1	204038.28	1190585.95
A2	204078.81	1190630.76
A3	204009.66	1190693.40
A4	203992.45	1190674.40
A5	204005.93	1190662.19
A6	203982.59	1190636.45
A7	204025.13	1190652.91
A8	204031.85	1190660.32
A9	204017.72	1190659.62
A10	204024.44	1190667.03
A11	204041.77	1190628.87
A12	204050.48	1190638.46
A13	204034.79	1190635.22
A14	204043.50	1190644.80

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0 10 20
SCALE, FEET

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NO.	DATE	ISSUE/REVISION	APP
3	8/11/2023	DRAFT - LEGEND REVISION	MJO
2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
1	6/6/2023	DRAFT - FOR REGULATORY SUBMITTAL	***

DRAFT

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Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

EXCAVATION PLAN

DWG. NO. 5

SHEET NO. 5 OF 9

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GENERAL NOTES:

1. PREPARE AN EXCAVATION SUPPORT SYSTEM STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK.
2. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY EXCAVATION SUPPORT SYSTEMS. USE APPROPRIATE DESIGN LOADINGS AND CRITERIA AS NECESSARY TO ENSURE SATISFACTORY PERFORMANCE, BUT NOT LESS THAN THE MINIMUM DESIGN CRITERIA SHOWN HERE. PROVIDE DESIGN CALCULATIONS AND DRAWINGS TO THE ENGINEER FOR REVIEW AND ACCEPTANCE.
3. RECOMMENDED SOIL PROPERTIES FOR DESIGN ARE SHOWN HERE. THE CONTRACTOR SHALL MAKE THEIR OWN EVALUATION OF THE AVAILABLE GEOTECHNICAL DATA TO SELECT APPROPRIATE DESIGN VALUES FOR THEIR DESIGN OF THE EXCAVATION SUPPORT SYSTEMS. THE DESIGN VALUES SELECTED BY THE CONTRACTOR SHALL NOT BE LESS CONSERVATIVE THAN THE VALUES SHOWN ON THE DRAWINGS. IF THE DESIGN VALUES SELECTED BY THE CONTRACTOR ARE LESS CONSERVATIVE THAN THE VALUES SHOWN ON THE DRAWINGS, THE CONTRACTOR'S DESIGN SUBMITTAL MUST INCLUDE TECHNICAL BACKUP TO JUSTIFY THE USE OF THE LESS CONSERVATIVE DESIGN VALUES.
4. THE DESIGN CALCULATIONS SHALL ACCOUNT FOR ALL STAGES OF CONSTRUCTION, INCLUDING INTERMEDIATE EXCAVATION STAGES AND REMOVAL OF BRACING. THE CONSTRUCTION SEQUENCE SHALL BE SHOWN ON THE DESIGN DRAWINGS.
5. REMOVAL OF TEMPORARY BRACING ELEMENTS SHALL BE PLANNED SO AS TO AVOID ADDING LOAD TO PERMANENT STRUCTURES OR OTHER MEMBERS OF THE TEMPORARY SUPPORT SYSTEM IN EXCESS OF THEIR DESIGN LOADS.
6. WHERE THE LOADING CONDITIONS ON OPPOSITE SIDES OF AN EXCAVATION ARE NOT EQUAL, THE OVERALL STABILITY OF THE EXCAVATION SUPPORT SYSTEM SHALL BE ANALYZED AND THE STRUCTURAL MEMBERS SHALL BE DESIGNED TO TAKE THIS CONDITION INTO ACCOUNT.
7. UNLESS NOTED OTHERWISE, TEMPORARY EXCAVATION SUPPORT SYSTEMS SHALL BE DESIGNED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING REFERENCE STANDARDS:
   "STEEL CONSTRUCTION MANUAL" OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC).
   "STRUCTURAL WELDING CODE - STEEL, AWS D1.1" OF THE AMERICAN WELDING SOCIETY (AWS).
   "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE, ACI-318" OF THE AMERICAN CONCRETE INSTITUTE (ACI).

EXCAVATION SUPPORT SYSTEM NOTES:

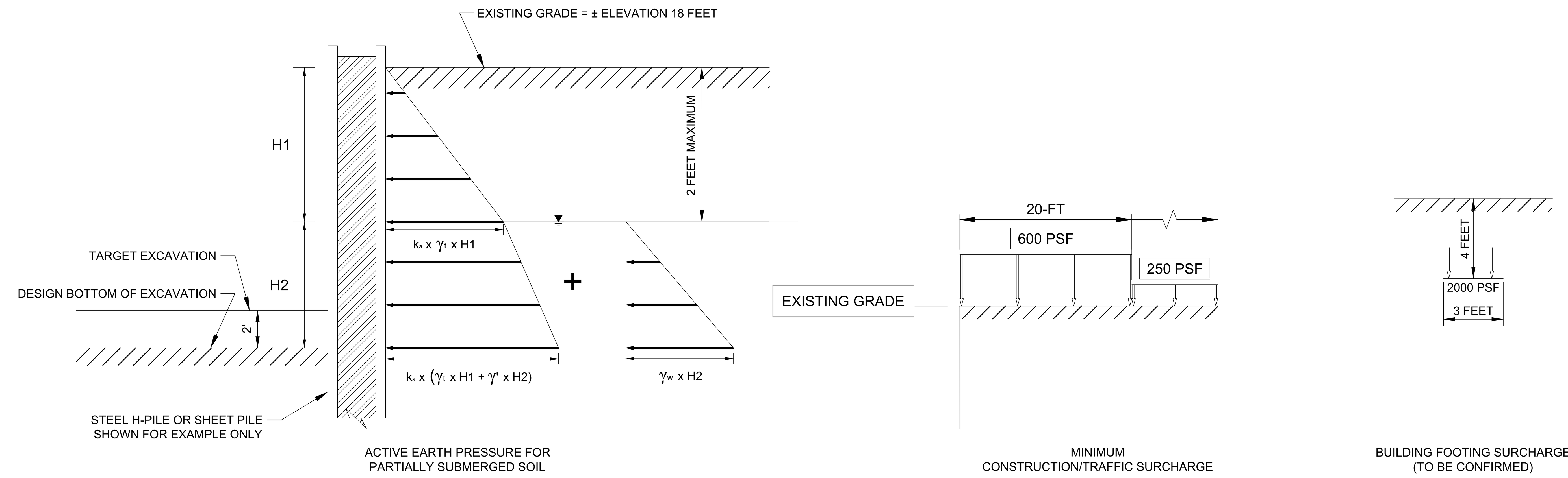
1. PROVIDE AN EXCAVATION SUPPORT SYSTEM CAPABLE OF EXCAVATING TO THE TARGET ELEVATIONS, PLUS, AN ADDITIONAL 2 FEET BELOW THE TARGET ELEVATIONS WITHOUT REQUIRING REDESIGN.
2. DESIGN FOR A MINIMUM FACTOR OF SAFETY OF 1.5 AGAINST SLIDING AND OVERTURNING.
3. INSTALL EXCAVATION SUPPORT SYSTEM AS CLOSE TO EXISTING STRUCTURES AS POSSIBLE.

MINIMUM DESIGN LATERAL PRESSURE NOTES:

1. MINIMUM DESIGN PRESSURE FOR CANTILEVER WALLS IS THE ACTIVE PRESSURE COMPUTED USING THE SOIL PROPERTIES IN TABLE 2, AND THE APPARENT PRESSURE ENVELOPES SHOWN IN DETAIL 1/4.
2. IF PROPOSING A BRACED EXCAVATION SUPPORT SYSTEM, USE DESIGN PROCEDURES CONFORMING TO CONVENTIONAL ENGINEERING THEORY.
3. INCORPORATE FULL HYDROSTATIC WATER PRESSURE ON THE DESIGN WHEN CALCULATING THE FACTOR OF SAFETY.
4. THE MINIMUM DESIGN CONSTRUCTION/TRAFFIC SURCHARGE IS BASED ON A 600 PSF VERTICAL SURFACE PRESSURE ACTING OVER A 20-FOOT-WIDE AREA ADJACENT TO THE EXCAVATION, BEYOND WHICH A 250 PSF VERTICAL SURFACE PRESSURE IS ASSUMED. DESIGN FOR HIGHER SURCHARGE PRESSURES IF LARGER SURFACE PRESSURES ARE ANTICIPATED. DESIGN FOR LESS THAN THIS MINIMUM SURCHARGE PRESSURE IS PERMITTED WHERE CONSTRUCTION SURCHARGE RESTRICTIONS ARE IMPOSED IN THE FIELD.
5. THE LOWEST DESIGN WATER LEVEL INSIDE THE EXCAVATION SUPPORT SYSTEM IS 2 FEET BELOW GROUND SURFACE.

INSTRUMENTATION NOTES:

1. THE DESIGN, INSTALLATION, AND MONITORING OF ALL GEOTECHNICAL INSTRUMENTATION WILL BE PERFORMED BY OTHERS.
2. VIBRATION MONITORING DURING THE INSTALLATION OF THE EXCAVATION SUPPORT SYSTEM WILL BE PERFORMED BY OTHERS.
3. ENGINEER WILL PROVIDE ALL BASELINE AND ROUTINE DATA TO CONTRACTOR. PROVIDE ENGINEER WITH SAFE ACCESS TO ALL GEOTECHNICAL INSTRUMENTS. CONTRACTOR MAY OBTAIN ADDITIONAL OR SUPPLEMENTAL DATA AT NO ADDITIONAL COST TO NATIONAL GRID.



1/4 DETAIL

LATERAL EARTH PRESSURE DIAGRAM - MINIMUM DESIGN PRESSURE ABOVE BOTTOM OF EXCAVATION

TABLE 2: LIST OF SYMBOLS

H1 =	HEIGHT OF CUT IN FEET FROM GROUND SURFACE TO THE TOP OF THE GROUNDWATER TABLE
H2 =	HEIGHT OF CUT IN FEET FROM THE TOP OF THE GROUNDWATER TABLE TO THE BOTTOM OF EXCAVATION
γ_t =	TOTAL SOIL UNIT WEIGHT
γ' =	EFFECTIVE SOIL UNIT WEIGHT $(\gamma_t - \gamma_w)$
γ_w =	UNIT WEIGHT OF WATER
φ =	FRICTION ANGLE
k_o =	AT REST LATERAL PRESSURE COEFFICIENT
k_a =	ACTIVE LATERAL PRESSURE COEFFICIENT
k_p =	PASSIVE LATERAL PRESSURE COEFFICIENT
K =	PERMEABILITY
PSF =	POUNDS PER SQUARE FOOT
PCF =	POUNDS PER CUBIC FOOT
Su =	UNDRAINED SHEAR STRENGTH (PSF)
▼ =	WATER SURFACE

TABLE 3: RECOMMENDED SOIL PROPERTIES

STRATUM	APPROXIMATE STRATUM DEPTH (FEET)	TOTAL UNIT WEIGHT γ_t (PCF)	EFFECTIVE FRICTION ANGLE ϕ	ACTIVE SOIL PRESSURE COEFFICIENT Ka	PASSIVE SOIL PRESSURE COEFFICIENT Kp	UNDRAINED SHEAR STRENGTH Su (PSF)
FILL	SURFACE TO ±15	120	29°	0.35	2.88	NA
NARROWLY GRADED SAND	±15 TO ±30	125	32°	0.31	3.25	NA

REFER TO EXPLORATION LOGS FOR SUBSURFACE CONDITION AT SPECIFIC LOCATIONS.
DATA TO BE UPDATED BASED ON GEOTECHNICAL TEST BORINGS.

Not for Construction

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0 1"

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DRAFT

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GEI Project 093180

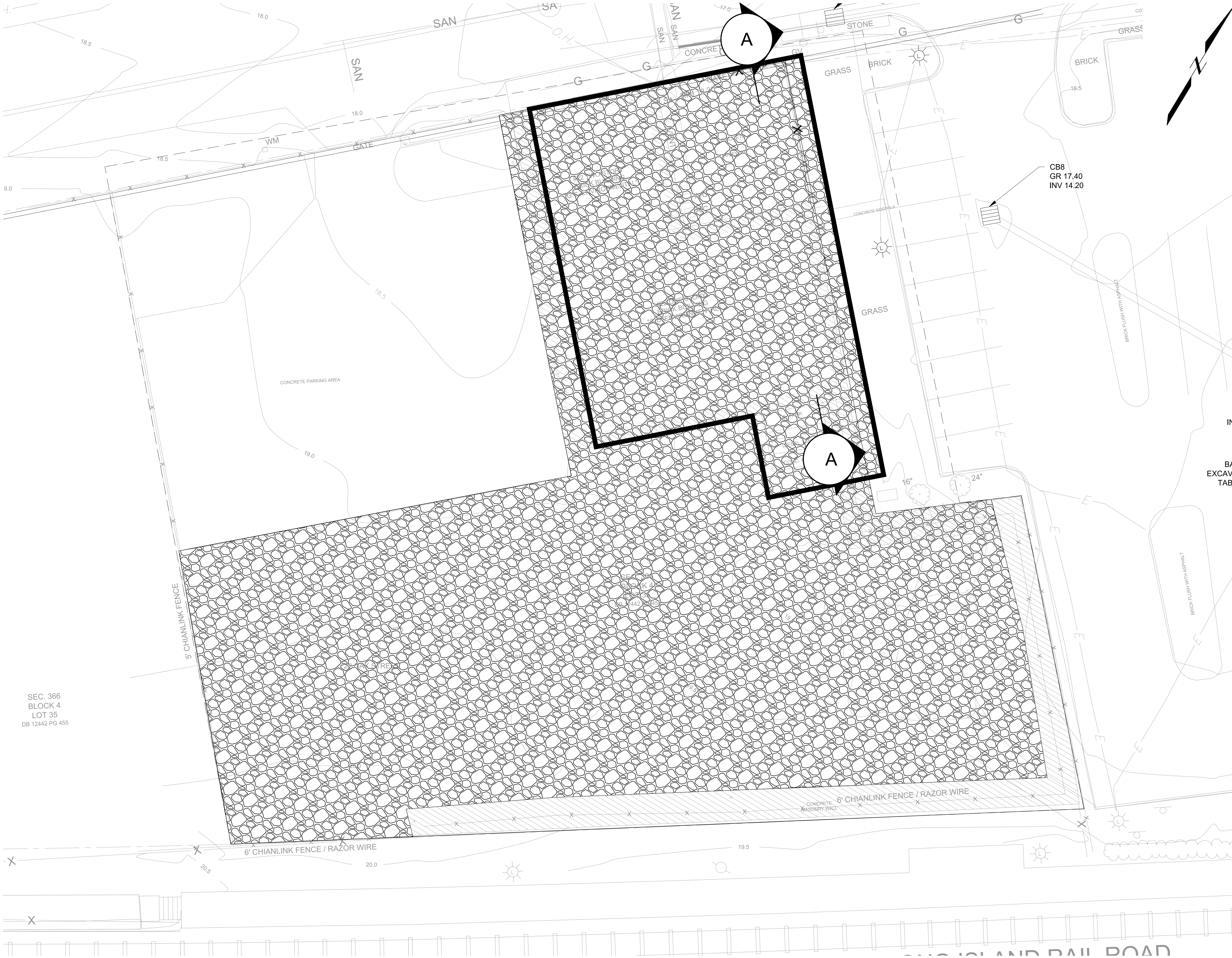
Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

EXCAVATION SUPPORT AND INSTRUMENTATION DETAILS

DWG. NO. 6

SHEET NO. 6 OF 9

\\geiconsulta B:\Working\NATIONAL GRID\093180 NG-Bay Shore_Brightwaters\00_CAD\Design\22 OAK IRMWP\6 093180-IRMWP-ESID.dwg - 7/28/2023

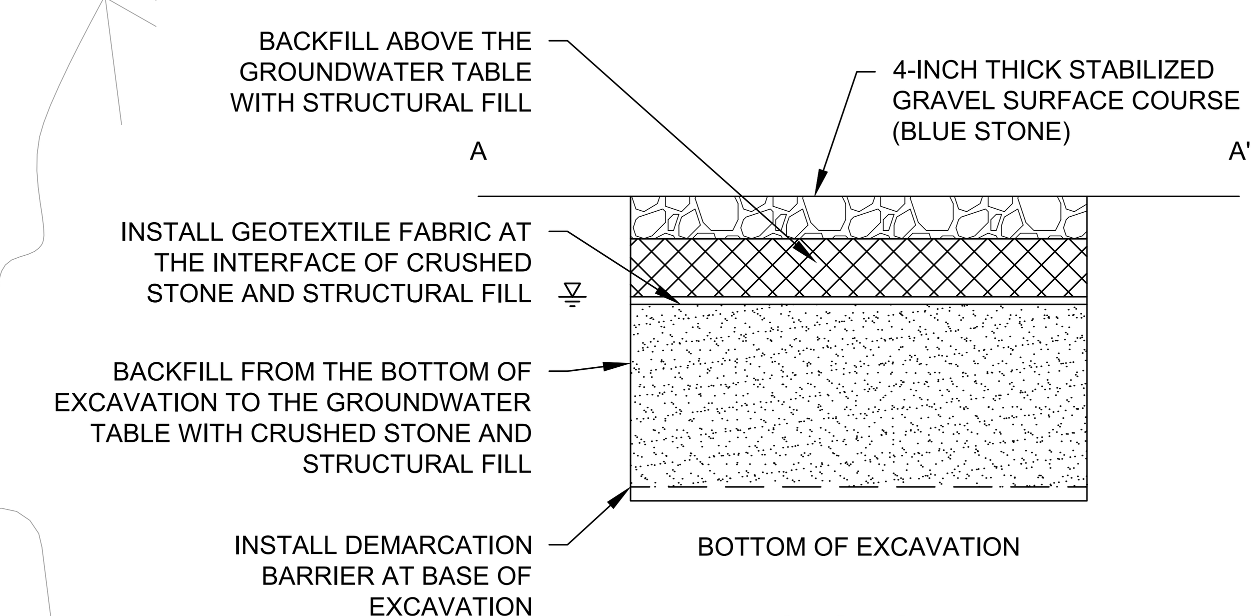


LEGEND:

- PROJECT LIMIT
- SURFACE CONTOUR
- RESTORE WITH BLUE STONE
- EXCAVATION LIMITS
- REMEDIAL EXCAVATION LIMITS

RESTORATION NOTES:

1. RESTORE ALL DAMAGED STRUCTURES OR UTILITIES TO THE SATISFACTION OF THE CONSTRUCTION MANAGER.
2. REMOVE SOIL EROSION AND SEDIMENT CONTROL MEASURES AFTER ALL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED OR VEGETATED AND FINAL GRADING HAS BEEN COMPLETED.
3. GRADE THE SITE TO MATCH ELEVATIONS AT THE PROPERTY BOUNDARY AND PROMOTE DRAINAGE ACROSS THE SITE.



SECTION

BACKFILL AND RESTORATION

NOT TO SCALE

Not for Construction

0 10 20

SCALE, FEET

Attention: If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
1	6/6/2023	DRAFT - FOR REGULATORY SUBMITTAL	***

DRAFT

Designed:	ES
Checked:	JP
Drawn:	JLD
Submitted By:	MJO
P.E. Number:	091317

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nationalgrid

GEI Project 093180

Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

RESTORATION PLAN

DWG. NO. 7

SHEET NO. 7 OF 9

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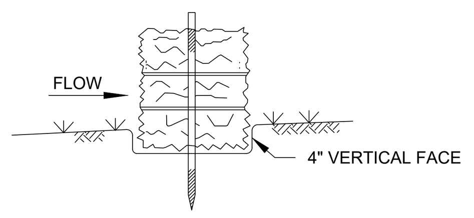
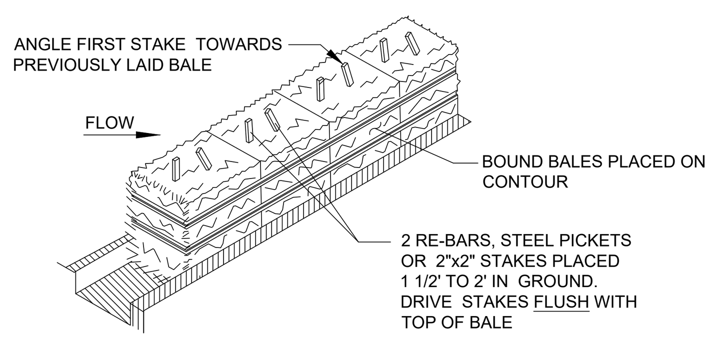


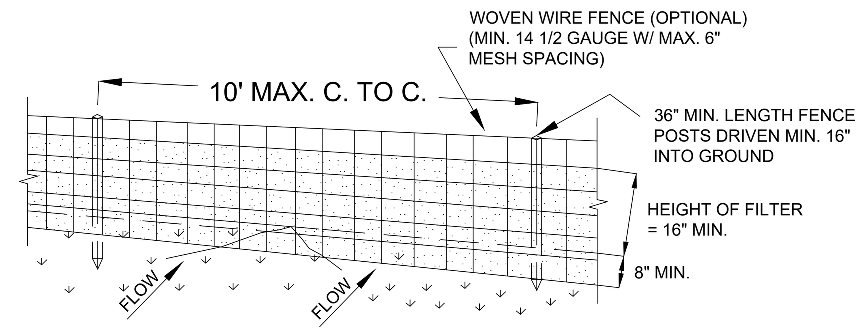
BEDDING DETAIL
NOT TO SCALE

DRAINAGE AREA NO MORE THAN 1/4 ACRES PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%

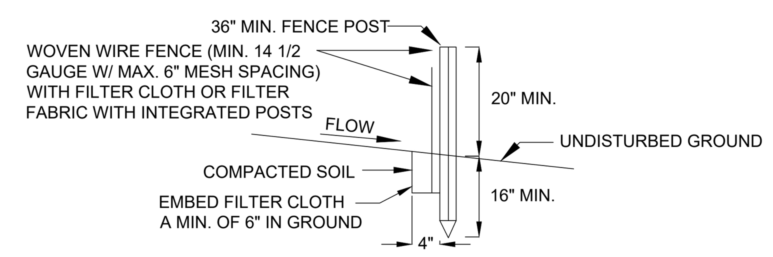


ANCHORING DETAIL
NOT TO SCALE

1/4 DETAIL
STRAW BALE DIKE

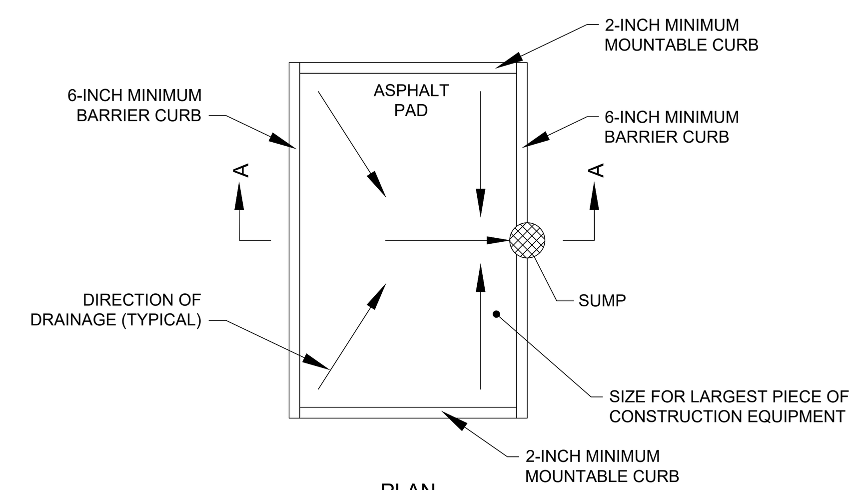


PERSPECTIVE VIEW
NOT TO SCALE

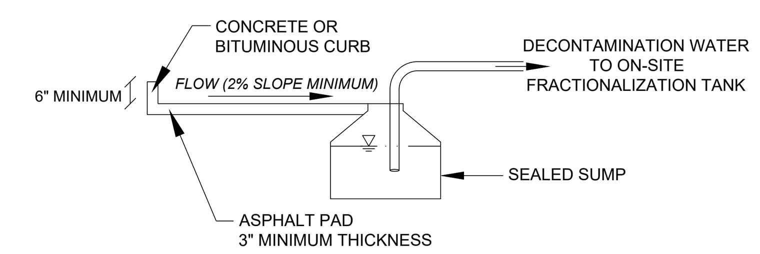


SECTION VIEW
NOT TO SCALE

2/4 DETAIL
SILT FENCE

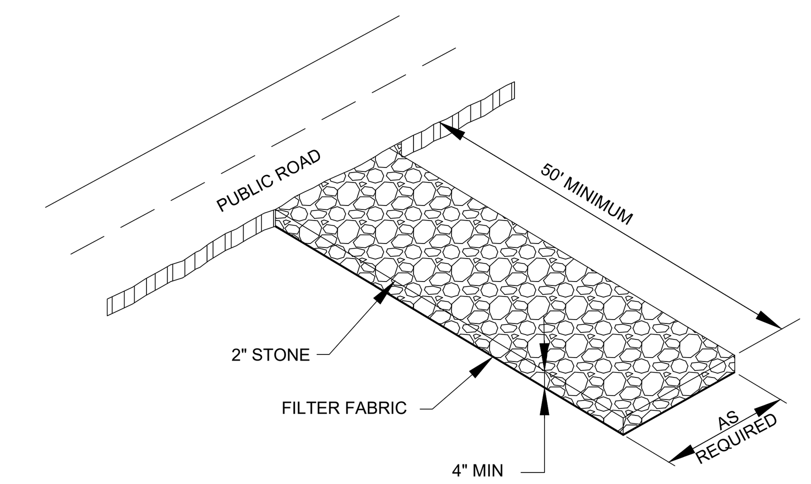


PLAN



SECTION A-A

3/4 DETAIL
EQUIPMENT DECONTAMINATION PAD



4/4 DETAIL
ANTI-TRACKING PAD

STRAW BALE DIKE NOTES:

1. PLACE BALES AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH THE ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EMBED EACH BALE IN THE SOIL A MINIMUM OF 4-INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. SECURELY ANCHOR BALES IN-PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. DRIVE THE FIRST STAKE IN EACH BALE TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. DRIVE STAKES FLUSH WITH THE BALE.
4. FREQUENTLY INSPECT EROSION CONTROLS. REPAIR/REPLACE DEFICIENT EROSIONS CONTROLS PROMPTLY, AS NEEDED.
5. REMOVE BALES WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE. REPLACE REMOVED BALES.

SILT FENCE NOTES:

1. FASTEN WOVEN WIRE FENCE SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FASTEN FILTER CLOTH SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24-INCHES AT TOP AND MID-SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6-INCH MAXIMUM MESH OPENING.
3. OVERLAP ADJACENT FILTER CLOTH SIX INCHES AND FOLD. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. PERFORM MAINTENANCE AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. FILTER FABRIC WITH INTEGRATED STAKES MAY BE USED INSTEAD OF WIRE FENCE.

DECONTAMINATION NOTES:

1. ALL VEHICLES EXITING EXCLUSION ZONE MUST PASS THROUGH THE CONTAMINANT REDUCTION ZONE. USE EQUIPMENT DECONTAMINATION PAD AS REQUIRED BY ENGINEER AND NYSDEC. CONTROL OVER SPRAY.

Not for Construction

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

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2	7/28/2023	DRAFT - ADDRESS REGULATORY COMMENTS	***
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P.E. Number:	091317

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GEI Project 093180

Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

SITE MANAGEMENT DETAILS

DWG. NO. 8

SHEET NO. 8 OF 9

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ENTERING THE SITE:

ENTERING THE SITE FROM LOCATIONS WEST VIA SUNRISE HWY

1. TAKE EXIT 43 TOWARD COUNTY ROAD 13/FIFTH AVENUE/BAY SHORE/BRENTWOOD (331 FT)
2. MERGE ONTO SUNRISE HWY SOUTH SERVICE RD (404 FT)
3. USE THE RIGHT LANE TO MERGE ONTO COUNTY RD 13/5TH AVE VIA THE RAMP TO FIFTH AVE S/BAY SHORE (0.3 MI)
4. CONTINUE ONTO N CLINTON AVE (0.5 MI)
5. TURN LEFT ONTO UNION BLVD (489 FT)
6. TURN LEFT ONTO 5TH AVE (449 FT)
7. TURN RIGHT ONTO OAK ST (433 FT)
8. TURN RIGHT INTO THE SITE.

ENTERING THE SITE FROM LOCATIONS EAST VIA SUNRISE HWY

1. TAKE EXIT 43 TOWARD FIFTH AVE/COUNTY RD 13/BRENTWOOD/BAY SHORE (0.1 MI)
2. MERGE ONTO SUNRISE HWY NORTH SERVICE RD (0.3 MI)
3. USE THE RIGHT LANE TO MERGE ONTO COUNTY RD 13/5TH AVE VIA THE RAMP TO BAY SHORE (0.5 MI)
4. CONTINUE ONTO N CLINTON AVE (0.5 MI)
5. TURN LEFT ONTO UNION BLVD (489 FT)
6. TURN LEFT ONTO 5TH AVE (449 FT)
7. TURN RIGHT ONTO OAK ST (433 FT)
8. TURN RIGHT INTO THE SITE.

DEPARTING THE SITE:

DEPARTING THE SITE TO DESTINATIONS EAST VIA SUNRISE HWY

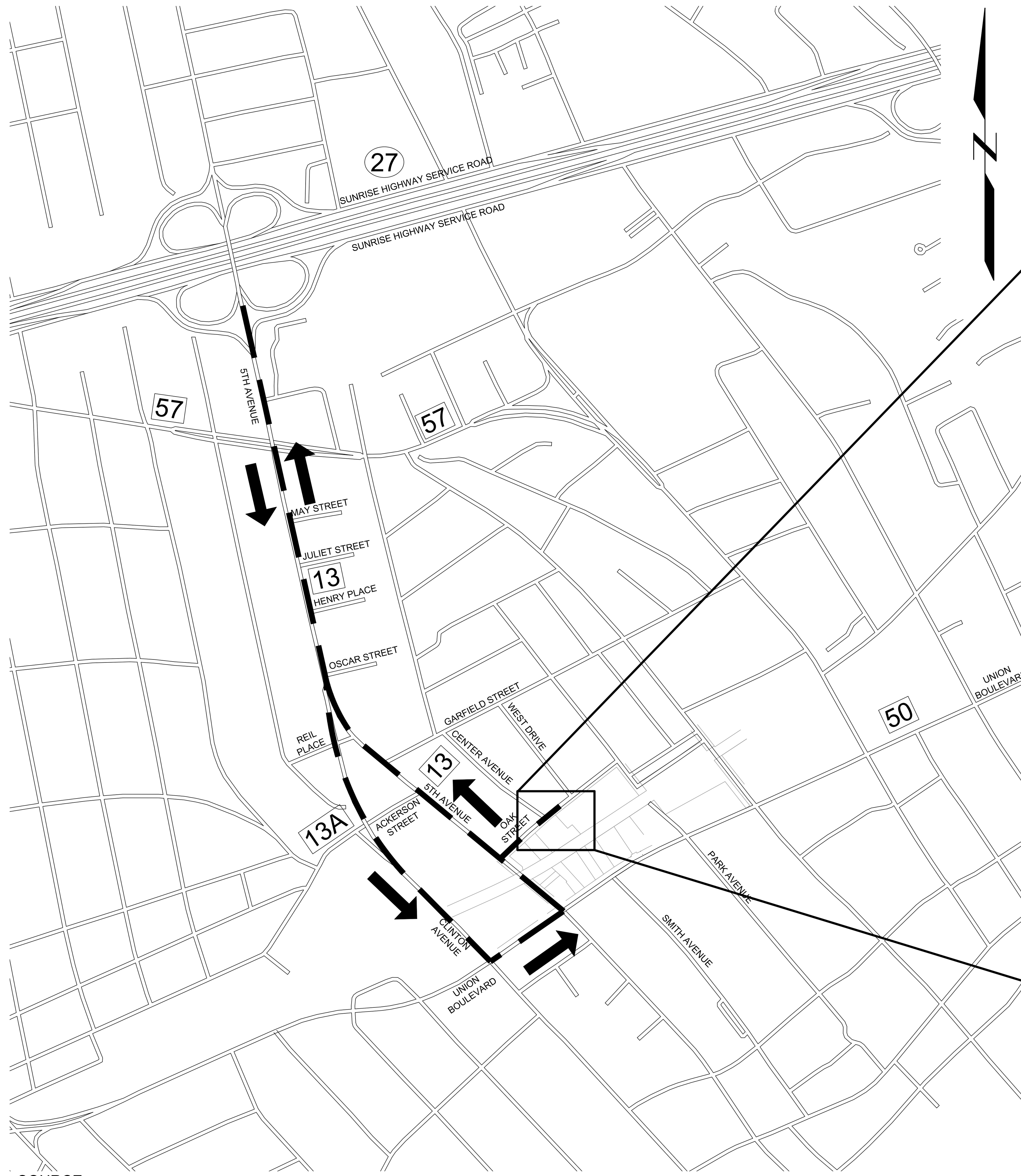
1. TURN LEFT ONTO OAK ST (433 FT)
2. TURN RIGHT ONTO 5TH AVE (0.6 MI)
3. TURN RIGHT ONTO THE RAMP TO NY-27 E (0.2 MI)
4. MERGE ONTO SUNRISE HWY SOUTH SERVICE RD (0.2 MI)
5. USE THE LEFT LANE TO MERGE ONTO NY-27 E VIA THE RAMP TO MONTAUK

DEPARTING THE SITE TO DESTINATIONS WEST VIA SUNRISE HWY

1. TURN LEFT ONTO OAK ST (433 FT)
2. TURN RIGHT ONTO 5TH AVE (0.8 MI)
3. SLIGHT RIGHT ONTO THE RAMP TO NY-27 W (0.1 MI)
4. MERGE ONTO SUNRISE HWY NORTH SERVICE RD (0.2 MI)
5. USE THE LEFT LANE TO MERGE ONTO NY-27 W VIA THE RAMP TO NEW YORK (0.1 MI)

NOTES:

1. VEHICLES TRANSPORTING CONSTRUCTION EQUIPMENT OR MATERIALS TO OR FROM THE SITE MAY NOT TRAVEL ON LOCAL STREETS. CONSTRUCTION VEHICLES MAY ONLY UTILIZE EXPRESSWAYS AND PROJECT TRUCK ROUTE.
2. DO NOT QUEUE TRUCKS AND EQUIPMENT OFF-SITE, OR INHIBIT THE USE OF DRIVEWAYS AND PARKING SPACES FOR LOCAL BUSINESSES OR RESIDENCES.
3. MAINTAIN TRAFFIC FLOW AND TRAFFIC CONTROLS IN ACCORDANCE WITH TOWN/COUNTY/STATE REQUIREMENTS AND TO THE SATISFACTION OF NATIONAL GRID AND THE CONSTRUCTION MANAGER.
4. PROVIDE FLAG SERVICES OR OTHER TRAFFIC CONTROL MEASURES AS NEEDED.
5. SWEEP TRUCK ROUTE A MINIMUM OF ONCE PER DAY OR AS DIRECTED BY NATIONAL GRID OR THE CONSTRUCTION MANAGER.
6. PARK CONSTRUCTION VEHICLES ON-SITE.



SOURCE:
GIS: NYS STREETS- NEW YORK STATE OFFICE OF CYBER SECURITY (OCS), ACCESSED FROM NYS GIS CLEARINGHOUSE <HTTP://WWW.NYSGIS.STATE.NY.US/INDEX.CFM>

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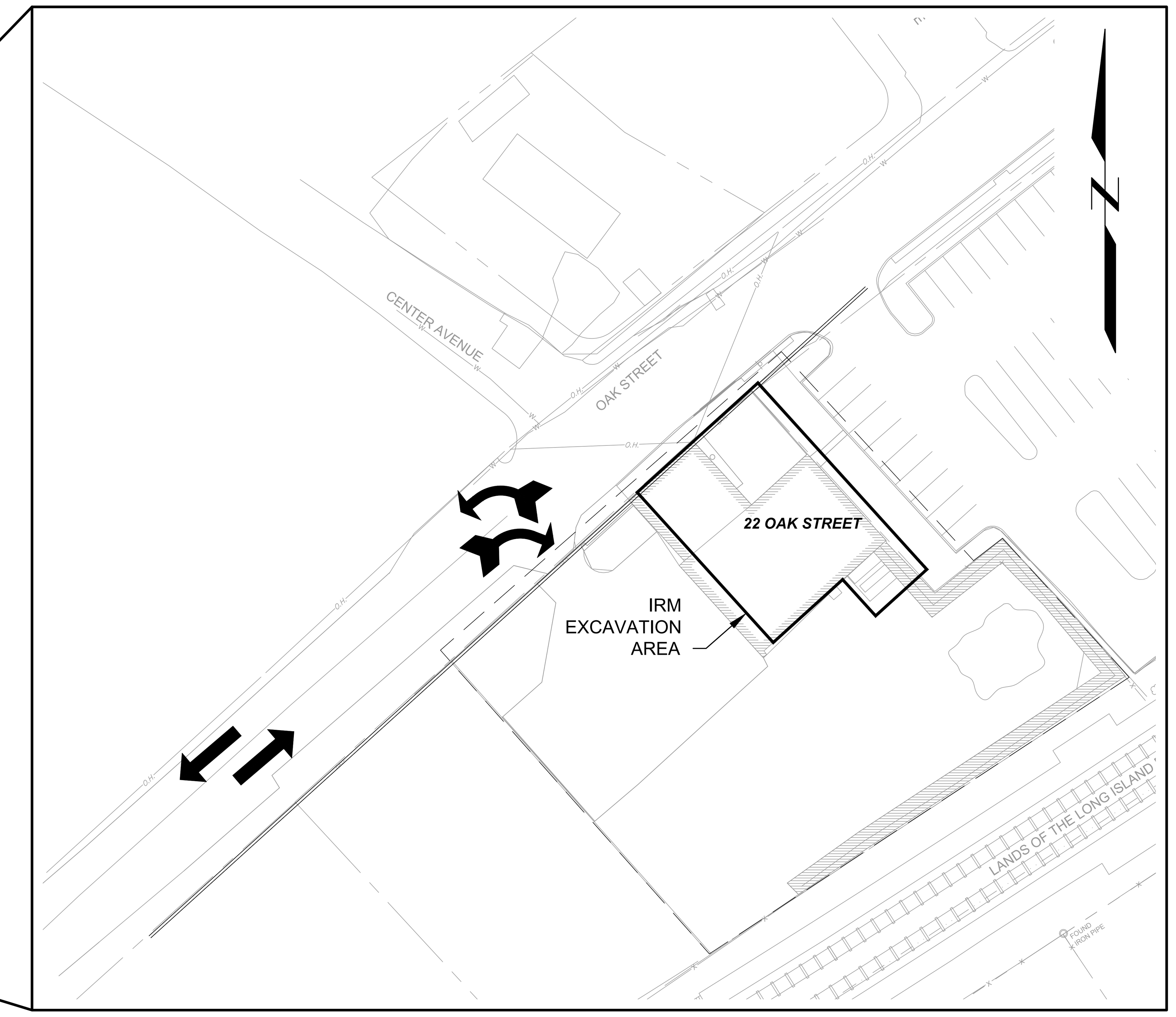
SCALE, FEET



PHASE I AND II

0 40 80
SCALE, FEET

LEGEND:

PROJECT LIMIT

PROPERTY LINE

PROJECT TRUCK ROUTE

TRAFFIC FLOW DIRECTION

13 COUNTY ROAD

27 STATE ROAD

Not for Construction

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nationalgrid

GEI Project 093180

Interim Remedial Measure Work Plan
Operable Unit No. 4 - 22 Oak Street
Suffolk County, Town of Islip, New York

TRAFFIC MANAGEMENT PLAN

DWG. NO. 9

SHEET NO. 9 OF 9

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Appendix D

Community Air Monitoring Plan

Consulting
Engineers and
Scientists

Community Air Monitoring Plan

Bay Shore/Brightwaters
Former MGP Site

Town of Islip, Village of Bay Shore
Suffolk County, New York
Site ID # 152172
NYSDEC Consent Index No. D1-0001-98-11

Submitted to:
National Grid
175 East Old Country Road
Hicksville, NY 11801

Submitted by:
GEI Consultants, Inc., P. C.

400 Unicorn Park Drive
Woburn MA 01801
(781) 721-4000

110 Walt Whitman Road, Suite 204
Huntington Station, NY 11746
(631) 760-9300

Revision 1
April 2020

Project 093180

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Appendix

MO/ah h:\tech\project\national grid\bay shore\ou-4 folders\22 oak street excavation\work plan\appendices\c - camp\smp_appc.ou4.hw152172.2020.04.07.camp.docx

Abbreviations and Acronyms

CAMP	Community Air Monitoring Plan
CLP	Contract Laboratory Program
CM	Construction Manager
MGP	Manufactured Gas Plant
NEMA	National Electrical Manufacturers Association
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PM-10	Respirable Particulate Matter
TVOC	Total Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Executive Summary

This Community Air Monitoring Plan (CAMP) Work Plan has been developed to provide procedures for measuring, documenting, and responding to potential airborne contaminants during intrusive activities at the Bay Shore/Brightwaters former Manufactured Gas Plant (MGP) site (Site). The procedures in this CAMP focus on air monitoring techniques and contingency measures designed to mitigate potential airborne contaminants. This CAMP Work Plan is based on the CAMP guidelines established by the New York State Department of Health (NYSDOH) in the New York State Department of Environmental Conservation (NYSDEC) *DER-10 Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010).

The CAMP provides Air Monitoring Procedures, Alert Levels, Response Levels, Action Levels, and Contingency Measures if Action Levels are approached. Alert Levels are National Grid internal established concentration levels for volatile organic compounds only and are not established by the NYSDOH or NYSDEC. Alert Levels are set below the levels established by the NYSDOH so that actions can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a screening tool to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during remedial activities. A Response Level is a contaminant concentration level that triggers a temporary work stoppage, continued monitoring, and potential contingent measures. An Action Level is a contaminant concentration that triggers work stoppage and implementation of contingent measures to mitigate potential airborne contaminants prior to resuming work activities. Response Levels and Action Levels are NYSDOH threshold levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10. Exceedances of either Response Levels or Actions Levels will be reported to NYSDEC and NYSDOH.

During times of potential related ground intrusive activities, perimeter air monitoring will be conducted using one or more of the following monitoring equipment configurations, as appropriate:

- Fixed-station air monitoring equipment,
- Moveable tripod-mounted air monitoring equipment, and/or
- "Walk-around" air monitoring equipment.

Monitoring will be performed for total volatile organic compounds (TVOC) and dust along the Site perimeter 24 hours a day when fixed stations are used or during working hours if the movable tripod-mounted units are used. The Contingency Plan defines Alert Levels, Response Levels, Action Levels, and specific contingency measures to be implemented. The response actions, potentially including work stoppage and work area controls by various methods, are intended to prevent or significantly reduce the migration of airborne contaminants from the Site.

National Grid's Air Monitoring Consultant (herein referred to as "Consultant") will implement the CAMP and will report any exceedance of Response Levels and Action Levels to the Contractor, the Construction Manager, National Grid, NYSDOH, and NYSDEC. As specified in the DER-10, all 15-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. The contractor conducting intrusive activities will be responsible for enacting contingency measures to respond to Alert Levels, if necessary, and to the exceedances of Response and Action Levels as they may occur. The Consultant will provide data summary reports to the Contractor, the Construction Manager, National Grid, and NYSDEC each week during ground intrusive activity or at the completion of the work.

1. Introduction

The New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), as presented in New York State Department of Environmental Conservation's (NYSDEC) document *DER-10 Technical Guidance for Site Investigation and Remediation*, recommends that real-time monitoring for total volatile organic compounds (TVOC) and particulates (i.e. dust) be conducted at the downwind perimeter of each designated work area during ground intrusive activities at contaminated sites. As such, this work plan describes the proposed air monitoring means and methods that will be implemented during intrusive activities for the Interim Remedial Measure in OU-4 at the Bay Shore/Brightwaters Former MGP Site (Site). A site location map is shown in Figure 1.

The purpose of the CAMP is to provide early detection in the field of potential short-term emissions and will be conducted in accordance with the generic NYSDOH CAMP.

The objectives of the CAMP are as follows:

- Provide an early warning system to alert the Contractor, the Construction Manager (CM), National Grid, and NYSDEC that concentrations of TVOC or dust in ambient air are approaching Action Levels due to Site activities.
- Provide potential contingency measures to be enacted by the contractor conducting intrusive activities and related contractors that are designed to reduce the off-site migration of contaminants if established Action Levels are approached or exceeded.
- Determine whether construction controls are effective in reducing ambient air concentrations to below Action Levels and make appropriate and necessary adjustments.
- Develop a permanent record that includes a database of perimeter air monitoring results, equipment maintenance, calibration records, and other pertinent information.

1.1 Roles and Responsibilities

The Consultant will implement the monitoring and reporting components of this CAMP under contract with National Grid. The contractor performing intrusive activities is responsible for the selection and implementation of appropriate contingency measures that will mitigate the off-site migration of contaminants in response to Action Levels being approached or exceeded. The remainder of this section specifies the roles and responsibilities of each entity relative to the CAMP. A communication flowchart is shown in Figure 2 with each entity and lines of communication for the CAMP.

1.1.1 Air Monitoring Consultant

The scope of the Consultant's activities will be limited to CAMP monitoring and reporting used for the CAMP. The Consultant is responsible for the Health and Safety of their employees. The Consultant's CAMP roles and responsibilities are as follows:

- The Consultant will monitor and record TVOC and dust at various locations around the Site as described in the following sections of this CAMP.
- On a daily basis, the Consultant will communicate to the following entities whether TVOC or dust exceeded Response Levels or Action Levels specified in Section 2.1, and suggest corrective actions required to address the situation. The Consultant will convey the CAMP results to the entities listed below and inform them if the Alert or Response Levels have been exceeded. The Consultant will direct contractors at the Site to take action if warranted.
    - **Contractor – TBD**
    - **New York State Department of Environmental Conservation**
      Mr. Douglas MacNeal
      Division of Environmental Remediation, NYSDEC
      Office: (518) 402-9684
      625 Broadway
      Albany, New York 12233-7014
    - **National Grid**
      Sarah Aldridge, Project Manager
      Office: (516) 545-2568
      175 East Old Country Road
      Hicksville, NY 11801
    - **Construction Manager - TBD**

- The Consultant will provide, maintain, and operate the equipment used to implement the CAMP.
- The Consultant will provide data summary reports to the Contractor, CM, National Grid, and NYSDEC each week during intrusive activity. The reports will identify Response Level and Action Level exceedances and will include data summary reports for all TVOC and dust data collected.

1.1.2 Contractor

The Contractor is the lead contractor responsible for site activities pertaining to the intrusive activities. The Contractor will be responsible for taking contingent actions in conjunction with National Grid in response to Response Level and Action Level exceedances. The Contractor will be responsible for taking contingent actions for Alert Levels, if required by the Consultant, CM, and /or National Grid. The Contractor is responsible for the Health and Safety of their employees.

1.1.3 National Grid

National Grid has the responsibility to provide mitigation services related to the release of Manufactured Gas Plant (MGP)-related vapors in excess of CAMP Response Level and Action Levels. National Grid is also ultimately responsible for the remediation of and maintenance of engineering controls at the Site under an approved work plan with NYSDEC.

1.1.4 New York State Department of Environmental Protection

NYSDEC is responsible for the environmental regulatory enforcement for all activities conducted at the site including compliance with this CAMP, stormwater runoff mitigation (erosion and sediment control), and all environmental and remediation regulations, policies, and guidance applicable to the Site. NYSDEC may provide on-site oversight personnel for the work being conducted.

1.1.5 Construction Manager

During larger intrusive work, National Grid may hire a separate CM; for smaller projects, the Consultant may serve as the CM. The CM is National Grid’s representative on site and is responsible for day to day operations on the Site. The CM will be responsible for directing the Contractor to take contingent actions in conjunction with National Grid in response to Alert Level (volatile organic compounds (VOC) only), Response Level, and/or Action Level exceedances. The CM is responsible for the Health and Safety of CM employees and subcontractors.

2. Sampling and Analytical Procedures

This section of the CAMP presents a detailed description of the air monitoring sampling and analytical procedures, including data management that will be used during ground intrusive site activities. The intent of the real-time monitoring program is to provide early detection in the field of short-term emissions and off-site migration of site-related TVOC and dust.

Real-time sampling methods will be utilized to determine ambient air concentrations during the project. Monitoring for TVOC and respirable particulate matter (PM-10) will occur at a minimum of two locations. Wind direction will be monitored under all monitoring approaches. A meteorological station will be established if a centralized data logger system is implemented. Supplemental walk-around perimeter monitoring for TVOC and PM-10, will occur along the perimeter of the project site on an as-needed basis. In the event of a possible exceedance of a Response Level or Action Level for TVOC or PM-10, the Consultant will compare upwind to downwind concentrations within 60 minutes of the possible exceedance to determine if site activity is causing the Response Level or Action Level exceedance. The air monitoring procedures and equipment are detailed below.

2.1 Alert Level, Response Level, and Action Levels

Alert Levels are not established by the NYSDOH or NYSDEC and are National Grid internally established concentration levels for TVOC only. Alert Levels are set below the levels established by the NYSDOH so that actions can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a screening tool to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during remedial activities.

A Response Level is a contaminant concentration level that triggers a temporary work stoppage, continued monitoring, reporting, and potential contingent measures. A Response Level serves as a screening tool for both TVOC and PM-10 to trigger contingent measures to assist in minimizing off-site transport of contaminants during remedial ground intrusive activities. Response Levels are NYSDOH thresholds levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10.

An Action Level is a contaminant concentration that triggers work stoppage and implementation of contingent measures to mitigate potential airborne contaminants prior to resuming work activities. Action Levels are NYSDOH threshold levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10.

For example, if high concentrations of dust are detected on the Site, contingent measures such as the use of spraying water may be required to reduce the concentrations and keep them below Response Levels.

The following target compounds and corresponding Response Levels, and Action Levels were developed in accordance with the NYSDOH Generic CAMP. Alert Levels are National Grid internally established concentration levels for TVOC only.

Target Compounds	**Alert Level**
TVOC (15-minute average concentration)	3.7 ppm greater than background*
Target Compounds	**Response Level**
TVOC (15-minute average concentration)	5.0 ppm greater than background*
Respirable Particulate Matter (PM-10)	100 $\mu g/m^3$ greater than background*
Target Compounds	**Action Level (**)**
TVOC (15-minute average concentration)	25 ppm greater than background*
Respirable Particulate Matter (PM-10)	150 $\mu g/m^3$ greater than background*

ppm - parts per million
$\mu g/m^3$ - micrograms per meter cubed
TVOC – total Volatile Organic Compounds
* Background is defined as the current upwind fifteen-minute average concentration.
** Action Level Exceedance requires work stoppage and mitigation of the condition causing the exceedance.

2.2 Air Monitoring Procedures

During ground intrusive activities during the OU-4 Interim Remedial Measure, perimeter air monitoring will be conducted using one or more of the following monitoring equipment configurations, as appropriate:

- Fixed-station air monitoring equipment,
- Moveable tripod-mounted air monitoring equipment, and/or
- “Walk-around” air monitoring equipment.

Monitoring will be performed for TVOC and dust along the Site perimeter 24 hours a day when fixed stations are used or during working hours if the movable tripod-mounted units are used.

Monitoring for TVOC and PM-10 will occur at a minimum of two locations using real-time sampling equipment. Readings will be checked manually on a predetermined, periodic basis if tripod-mounted units are used or transmitted to a centralized data logger system station once per minute. Depending on the units used, monitoring will be conducted during working hours or 24 hours a day 7 days a week during construction activity along the Site perimeter. Supplemental "walk-around" perimeter monitoring for TVOC and PM-10, and odor will occur along the perimeter of the project site on an as-needed basis. Each approach is detailed below.

It is anticipated that tripod-mounted stations will be used for minimally intrusive work such as installation of soil borings or monitoring wells and during shallow intrusive work during utility installation and maintenance. It is anticipated that fixed stations will only be used in the event of significant excavation work.

2.2.1 Fixed-Station Monitoring Procedures

Real-time air monitoring for TVOC and suspended particulates will be conducted upwind and downwind of the work area along the Site perimeter during significant excavation at the Site. Instruments will be positioned to monitor around the active excavation work zone based on a particular day's activities at a minimum of two locations adjacent to the work area. Real-time monitors will continuously gather data 24 hours a day 7 days a week. The air monitoring system consists of a minimum of two air monitoring stations, one meteorological tower, and one central computer system. The central computer system will be located in the project trailer or similar work area.

The real-time fixed air monitoring stations will be positioned between the work zone and the largest number of potential off-site receptors. Therefore, the placement of the fixed air monitoring stations is based on the need to document all potential off-site migration on the perimeter, but also recognizes the potential off-site receptors and the location of the proposed construction activities. Figure 3 displays a typical arrangement of fixed air monitoring stations around the OU-1 North Property as an example. The specific arrangement for each Controlled Property will vary based on the scope of work conducted at the site.

Each real-time air monitoring station contains the following:

1. Station enclosure
2. An organic vapor analyzer
3. A particulate monitor
4. A radio telemetry device

Each monitoring station is housed in a weather-tight National Electrical Manufacturers Association (NEMA)-4 type enclosure. Each monitoring station will continuously measure and record TVOC and PM-10 at a rate of one sample per minute and record 15-minute time-weighted running averages. Figure 4A shows an example of a typical fixed air monitoring station.

In addition to the air monitoring stations, a Campbell Scientific, Inc. Met Data1 meteorological monitoring system, or equivalent, will be established on site. The meteorological system will continuously monitor temperature, relative humidity, wind speed, and wind direction. Fifteen-minute average values for each meteorological parameter will be stored in the meteorological system and downloaded once per week. Wind direction and wind speed will be displayed on the central computer in real-time to determine upwind and downwind stations for assessing Alert, Response, and Action Levels. Upwind and downwind stations will be reduced real-time. Wind socks and/or flags may be placed at locations around the site to obtain real-time site-specific wind direction.

All TVOC, PM-10, and meteorological data will be stored in data loggers located within each monitoring/meteorological station. Stored analytical data along with system performance data from each station will be sent in real-time, via radio telemetry, to the Site central computer system for monitoring and analysis. The meteorological station will be downloaded at a minimum of once per week. In the event of severe weather or power loss at the site, data recording and/or recovery may be affected.

2.2.2 Tripod Mounted Monitoring Procedures

It is anticipated that tripod-mounted stations will be used for minimally intrusive work such as installation of soil borings or monitoring wells and during shallow invasive work during utility installation and maintenance. Instruments will be positioned along the Site perimeter to monitor the air based on a particular day's ground intrusive activities at a minimum of two locations (upwind and downwind). Real-time monitors will continuously gather data during periods of intrusive activity during working hours. The equipment will be manually read on a predetermined periodic cycle during the work activity.

The readings will be collected at a minimum of 15-minute intervals during periods of intrusive activities. Wind direction will be determined by using a wind sock or flagging placed on a pole at the Site.

Each air monitoring station would include the following:

1. Station Tripod and enclosure
2. An organic vapor analyzer
3. A particulate monitor

Figure 4B shows an example of a typical tripod-mounted air monitoring station.

Each monitoring station will continuously measure and record TVOC and PM-10. All TVOC and PM-10 will be stored in data loggers located within each monitoring station. Data from each piece of equipment will be downloaded daily at the completion of intrusive activities and stored on a central computer system. The location of each station, the work zone, and the wind direction will be noted daily. At each monitoring station location, the 15-minute average value of TVOC and PM-10 will be recorded. The 15-minute average value of TVOC and PM-10 data from the upwind and downwind station will be compared and resultant downwind concentration will be calculated and recorded.

2.2.3 Supplemental Perimeter Walk-around Monitoring

Supplemental walk-around perimeter monitoring for TVOC and PM-10 will occur along the perimeter of the project site on an as-needed basis. Specific site conditions that may trigger walk-around perimeter monitoring include:

- Visible dust
- Detection of TVOC and/or PM-10 at an air monitoring station at concentrations exceeding an Alert Level, Response Level, and Action Levels
- Direction by the CM, National Grid, and/or NYSDEC

Fifteen-minute average TVOC and PM-10 readings will be collected continuously at a downwind location between the work area and the nearest receptors.

When a triggering condition is observed during ground intrusive activity, the supplemental downwind perimeter monitoring will occur continuously until the conditions that triggered the monitoring have subsided. TVOC concentrations will be monitored and recorded using an organic vapor analyzer. PM-10 will be measured and recorded using a portable aerosol monitor equipped with a PM-10 impactor.

At each monitoring point, the 15-minute average value of TVOC and PM-10, sample time, and sample location will be collected and recorded. Additional temporary monitoring points may be established due to changing site or meteorological conditions.

2.2.4 Equipment Calibration

Equipment calibration will be performed according to manufacturer's instructions. Each organic vapor analyzer will be calibrated once daily using a certified standard isobutylene gas. Particulate monitors for PM-10 will be zeroed daily. Other hand-held portable equipment will be calibrated before each use, or a minimum of once per week when not in use.

2.3 Volatile Organic Compound (VOC) Analytical Sampling

For significant excavation when fixed stations are used, verification VOC samples will be collected once per week at two air-monitoring stations. The verification samples are collected to demonstrate that the real-time monitoring stations are effective in measuring the concentration of the VOC target compounds. VOC samples will be collected using 6-liter Summa® canisters (or equivalent vacuum canisters) and analyzed using United States Environmental Protection Agency (USEPA) Method TO-15 modified to include naphthalene. An accredited laboratory will perform the analytical testing on the canisters and will provide Category B deliverables as required by the New York Analytical Services Protocol. The data will be validated in accordance with the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, EPA 540/R-99/008 (October 1999) and the USEPA Region II Functional Guidelines for Evaluating Organic Analyses (September 2006), modified as necessary to accommodate the non-CLP methodologies used.

2.4 Pre-Construction Baseline Sampling

For significant excavation, pre-construction sampling will be completed to establish baseline ambient air concentrations prior to the start of excavation activities. Baseline conditions will be developed for TVOC and PM-10 in ambient air when real-time fixed station sampling methods are used. Sample collection and analysis methods will follow those described in subsection 2.2.1. Pre-construction real-time sampling will take place at the fixed air monitoring station locations to determine TVOC and PM-10 baseline conditions. TVOC and PM-10 data will be recorded 24 hours per day for a minimum of three days.

2.5 Data Management Procedures

This section of the Plan discusses the data management procedures that will be used during the remedy. Data may be generated from a variety of sources, including real-time fixed station analytical monitoring, supplemental walk-around monitoring, tripod-mounted monitoring stations, and meteorological monitoring.

These data must be reduced, evaluated, verified, and presented to related parties in a timely manner to facilitate decision-making. The data management process for each source of data is discussed below.

The Consultant will review all real-time data in a timely manner following collection and transmit the final summary report to National Grid.

2.5.1 Fixed Station Monitoring

Analytical data generated at each fixed-station are sent to the central computer system via radio telemetry or will be manually downloaded daily. The monitoring data will also be downloaded to the project database for data evaluation. The following daily charts or tables will be prepared:

- Instantaneous and averaged TVOC concentrations compared to the TVOC Action Level
- Instantaneous and averaged PM-10 concentrations compared to the PM-10 Action Level
- Supplemental Perimeter Walk-Around PM-10 concentrations compared to the Action Level (if any)
- Supplemental Perimeter Walk-Around TVOC concentrations compared to the TVOC Action Level (if any)
- Air monitoring station locations

The following weekly charts or tables will be prepared:

- Meteorological conditions
- Maximum 15-minute average concentrations of TVOC and PM-10
- Upwind and downwind comparison of Response Level and Action Levels reached during the week
- Summary of site activities
- Air monitoring station locations

2.5.2 Tripod Mounted/Supplemental Perimeter Walk-around Monitoring

Analytical data generated at each tripod mounted station and from any supplemental perimeter walk-around monitoring will be manually downloaded daily for data evaluation. The following daily table(s) will be prepared:

- Daily maximum instantaneous and averaged TVOC concentrations compared to the TVOC Action Level
- Daily maximum instantaneous and averaged PM-10 concentrations compared to the PM-10 Action Level
- Supplemental Perimeter Walk-Around PM-10 concentrations compared to the Action Level (if any)
- Supplemental Perimeter Walk-Around TVOC concentrations compared to the TVOC Action Level (if any)
- Air monitoring station locations

The following weekly table(s) will be prepared:

- Maximum 15-minute average concentrations of TVOC and PM-10
- Upwind and downwind comparison of Response Level and Action Levels reached during the week if the daily maximum 15-minute average concentrations of TVOC and PM-10 exceeded a Response Level or Action Levels
- Summary of site activities
- Air monitoring station locations

3. Alert Responses

The purpose of this section is to identify the procedures to be followed in response to elevated levels of target compounds measured during intrusive activities. Response actions will be enacted by the Contractor, CM, and National Grid. The Consultant will report any occurrences where a Response Level or Action Level is exceeded, which would require response measures to be enacted. The NYSDEC will be notified of any occurrence where an Action Level (NYSDOH threshold) is exceeded. If there is a verified exceedance, the Consultant will inform the CM, National Grid, and NYSDEC within 60 minutes of the exceedance via e-mail at a minimum. In general, a tiered approach to site conditions with corresponding response actions will be implemented during the air monitoring program. The four tiers of site conditions are defined as follows.

- **Site Condition 1.** Normal or ambient air-conditions where all target concentrations are less than the Alert Level for TVOC and the Response Levels for respirable particulate matter
- **Preliminary Site Condition 2.** Concentration of TVOC only is equal to or greater than the Alert Level, but less than the Response Level.
- **Site Condition 2.** Concentration of at least one target is equal to or greater than Response Level, but less than the Action Level.
- **Site Condition 3.** Concentration of at least one target is equal to or greater than the Action Level.

The response plan will rely on real-time data generated from the fixed-station monitoring, portable equipment monitoring, and meteorological monitoring. These data sources will be evaluated together in order to make appropriate decisions concerning site conditions and potential control measures.

An explanation of the notification system, specific conditions, and response actions for TVOC and PM-10 is presented below.

3.1 Total Volatile Organic Compounds

TVOC concentrations in air will be measured and recorded by station monitors. Figure 5 presents the TVOC decision diagram that will be used to determine the appropriate site condition based on contaminant concentrations.

Specific TVOC target concentrations for Site Condition 1, Preliminary Site Condition 2, Site Condition 2, and Site Condition 3 are summarized in Table 1.

3.1.1 Site Condition 1

Site Condition 1 will be in effect when the TVOC concentration is less than the Alert Level (3.7 ppm). Under a Site Condition 1, each organic vapor analyzer located at the monitoring stations will collect and analyze a TVOC sample at a frequency of one sample per minute.

3.1.2 Preliminary Site Condition 2

Preliminary Site Condition 2 will be in effect if the TVOC concentration measured at a station is greater than or equal to the Alert Level (3.7 ppm) but less than the Response Level (5.0 ppm). The Consultant will notify the Contractor, CM, and National Grid of elevated measurements and a Preliminary Site Condition 2.

At this time, the upwind and downwind concentrations will be compared to determine if the Preliminary Site Condition 2 is due to site activities. If downwind TVOC concentrations are greater than upwind concentrations, then it will be assumed that the Preliminary Site Condition 2 is due to site activities.

If the above condition is true, then a Preliminary Site Condition 2 will be verified. Under a verified Preliminary Site Condition 2, a contingency meeting will be held and attended by the Consultant, the Contractor, CM, and National Grid. The Contractor, CM, and National Grid will determine appropriate response actions. This meeting will be held within 60 minutes of the Preliminary Site Condition 2 verification. Possible Preliminary Site Condition 2 response actions are listed in Table 2. The site will remain in Preliminary Site Condition 2 as long as the TVOC concentration is between 3.7 ppm (Alert Level) and 5.0 ppm (Response Level), based on 15-minute averages.

The site will return to Site Condition 1 if the following condition is true.

- The 15-minute average concentrations for TVOC at each of the monitoring stations are less than 3.7 ppm (Alert Level).

3.1.3 Site Condition 2

Site Condition 2 will be in effect if average TVOC concentrations increase to greater than the Response Level of 5.0 ppm. Site Condition 2 will remain in effect if one of the following conditions is true.

- The average TVOC concentration, measured over a 15-minute period, is greater than or equal to 5.0 ppm (Response Level)

Under Site Condition 2, construction activities will be temporarily halted. A meeting attended by the Consultant, the Contractor, CM, National Grid, and NYSDEC, will be held within 60 minutes of the Site Condition 2. The Contractor, CM, National Grid, and NYSDEC will determine appropriate response actions. Possible Site Condition 2 corrective measures/actions are listed in Table 2. After appropriate corrective measures/actions are taken, work activities may resume provided that the TVOC concentration at the Site perimeter is no more than 5.0 ppm above background for the 15-minute average.

If average TVOC concentrations fall below the Response Level, then the site will be returned to Preliminary Site Condition 2, at which time work activities may resume. The Preliminary Site Condition 2 site condition will remain in effect as long as the following condition is true.

- The 15-minute average concentration for TVOC is greater than 3.7 ppm (Alert Level) and less than 5.0 ppm (Response Level).

The site will return to Site Condition 1 if the following condition is true.

- The 15-minute average concentrations for TVOC at each of the monitoring stations are less than 3.7 ppm (Alert Level).

3.1.4 Site Condition 3

Site Condition 3 will be in effect if average TVOC concentrations increase to greater than the Action Level of 25.0 ppm. Site Condition 3 will remain in effect if one of the following conditions is true.

- The average TVOC concentration, measured over a 15-minute period, is greater than 25 ppm (Action Level).

Under Site Condition 3, all construction activities will be halted. A meeting attended by the Consultant, the Contractor, CM, National Grid, and NYSDEC, will be held within 60 minutes of the Response Level notification. The Contractor, CM, National Grid, and

NYSDEC will determine appropriate response actions. Possible Site Condition 3 corrective measures/actions are listed in Table 2. After appropriate corrective measures/actions are taken, work activities may resume provided that the TVOC concentration at the Site perimeter is no more than 5.0 ppm above background for the 15-minute average.

If average TVOC concentrations fall below the Action Level, then the site will be returned to a Site Condition 2. If average TVOC concentrations fall below the Response Level, then the site will be returned to Preliminary Site Condition 2, at which time work activities may resume. The Preliminary Site Condition 2 site condition will remain in effect as long as the following condition is true.

- The 15-minute average concentration for TVOC is greater than 3.7 ppm (Alert Level) and less than 5.0 ppm (Response Level).

The site will return to Site Condition 1 if the following condition is true.

- The 15-minute average concentrations for TVOC at each of the monitoring stations are less than 3.7 ppm (Alert Level).

3.2 Respirable Particulate Matter

PM-10 concentration in air will be measured and recorded by the station monitors and may be temporarily suspended during periods of rain. Figure 6 presents the PM-10 decision diagram.

Specific PM-10 target concentrations for Site Condition 1, Preliminary Site Condition 2, Site Condition 2, and Site Condition 3 are summarized in Table 1.

3.2.1 Site Condition 1

Site Condition 1 will be in effect when the downwind 15-minute average PM-10 concentration is less than 100 $\mu g/m^3$ above the current average upwind conditions (Response Level).

3.2.2 Site Condition 2

Site Condition 2 will be in effect if the average 15-minute PM-10 concentration at a station is greater than 100 $\mu g/m^3$ (Response Level), less than 150 $\mu g/m^3$ (Action Level), and related to site activities. The Consultant will notify the Contractor, CM, National Grid, and NYSDEC of elevated measurements and a possible Site Condition 2. The upwind and downwind PM-10 concentrations will be compared to determine if the elevated PM-10 concentrations are due to site activities. If downwind PM-10 concentrations are 100 $\mu g/m^3$greater than upwind concentrations (Response Level), then it will be assumed that the Site Condition 2 is due to site activities.

The Site Condition 2 will remain in effect as long as the average PM-10 concentration is greater than or equal to 100 $\mu g/m^3$ above upwind conditions (Response Level), and less than or equal to 150 $\mu g/m^3$(Action Level). Under a verified Site Condition 2, dust suppression techniques must be implemented by the Contractor and/or National Grid contractors. At this point, routine monitoring continues and 15-minute averages continue to be evaluated. Work may continue with dust suppression techniques provided that downwind PM-10 levels do not exceed 150 $\mu g/m^3$ above the upwind level (Action Level) and provided that no visible dust is migrating offsite from the work area.

A contingency meeting attended by the Consultant, the Contractor, CM, National Grid, and NYSDEC will be held within 60 minutes of the verified Site Condition 2 if the condition is not mitigated by dust suppression techniques. Possible response actions for dust control are listed in Table 2.

3.2.3 Site Condition 3

Site Condition 3 will be in effect if the average 15-minute PM-10 concentration exceeds 150 $\mu g/m^3$ above the current average upwind concentration (Action Level). Under Site Condition 3, work must be stopped and a meeting attended by the Consultant, the Contractor, CM, National Grid, and NYSDEC will be held within 60 minutes of the Response Level notification. The Contractor, CM, National Grid, and NYSDEC will determine appropriate response actions. Possible Site Condition 3 response actions for PM-10 are listed in Table 2. Work may resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

3.3 Visible Dust

In addition to measured PM-10 levels, the CAMP requires monitoring of visible dust conditions. If visible airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 levels do not exceed the Action Level concentration of 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

4. Reporting

The Consultant will prepare and submit weekly reports to the Contractor, CM, National Grid, and NYSDEC summarizing the CAMP monitoring data. Each report will consist of a letter-style report and charts/tables summarizing the following:

- Maximum 15-minute average concentrations of TVOC, and PM-10
- Upwind and downwind comparison of Response Levels and Action Level reached during the weekly period
- Summary of site activities
- Air monitoring station locations
- Meteorological conditions

Following the completion of all work, a report will be developed summarizing the intrusive activities. As part of the report, the CAMP activities will be documented.

References

New York State Department of Environmental Conservation. 2010. DER-10 / Technical Guidance for Site Investigation and Remediation. Division of Environmental Remediation. May 3, 2010. Appendix 1A. pp. 204-206.

Tables

Table 1
Target Concentrations for Site Conditions
Community Air Monitoring Plan
Bay Shore/Brightwaters Former MGP Site
Interim Site Management Plan
Bay Shore, New York

	Alert Level[1]	NYSDOH generic CAMP[2] Response Level	NYSDOH generic CAMP[2] Action Level	Site Condition 1	Preliminary Site Condition 2	Site Condition 2	Site Condition 3
TVOC	3.7 ppm	5.0 ppm	25 ppm	< 3.7 ppm	≥ 3	≥ 3 < 5.0 ppm	≥
PM-10	NA	100 µg/m^3	150 µg/m3	< 100 µg/m3	NA	≥ 3 < 150 µg/m3	≥ 3

Notes:

[1] Alert Levels are not established by the NYSDOH or NYSDEC and are internally established concentration levels for total volatile organic compounds. Alert Levels are set below the levels established by the NYSDOH so that actions can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a screening tool to trigger contingent measures

[2] Response Levels and Action Levels are defined in Appendix 1A of the New York State Department of Environmental Conservation *DER-10 / Technical Guidance for Site Investigation and Remediation*

µg/m3 - micrograms per cubic meter

ppmv - parts per million by volume

TVOC - total volatile organic compounds

PM-10 - particulate matter (i.e. dust) less than 10 microns in diameter

NA - not applicable

Table 2
Site Conditions and Response Actions
Community Air Monitoring Plan
Bay Shore/Brightwaters Former MGP Site
Interim Site Management Plan
Bay Shore, New York

Site Condition	Control Measure
Site Condition 1	Normal site activities - No control measures required
Site Condition 2	Establish trend of data and determine if evaluation/wait period is warranted Temporarily stop work Temporarily relocate work to an area with potentially lower emission levels Reschedule work activities Cover all or part of the excavation area Apply VOC emission suppressant foam over open excavation areas Slow the pace of construction activities Install a perimeter barrier fence Apply water on haul roads* Wet equipment and excavation faces* Spray water on buckets during excavation and dumping* Haul materials in properly tarped or watertight containers* Restrict vehicle speeds to 10 mph* Cover excavated areas and material after excavation ceases*
Site Condition 3	Halt work Encapsulate construction area and treat air exhaust Perform work during cold weather Cease construction activities Re-evaluate air monitoring work plan

Notes:

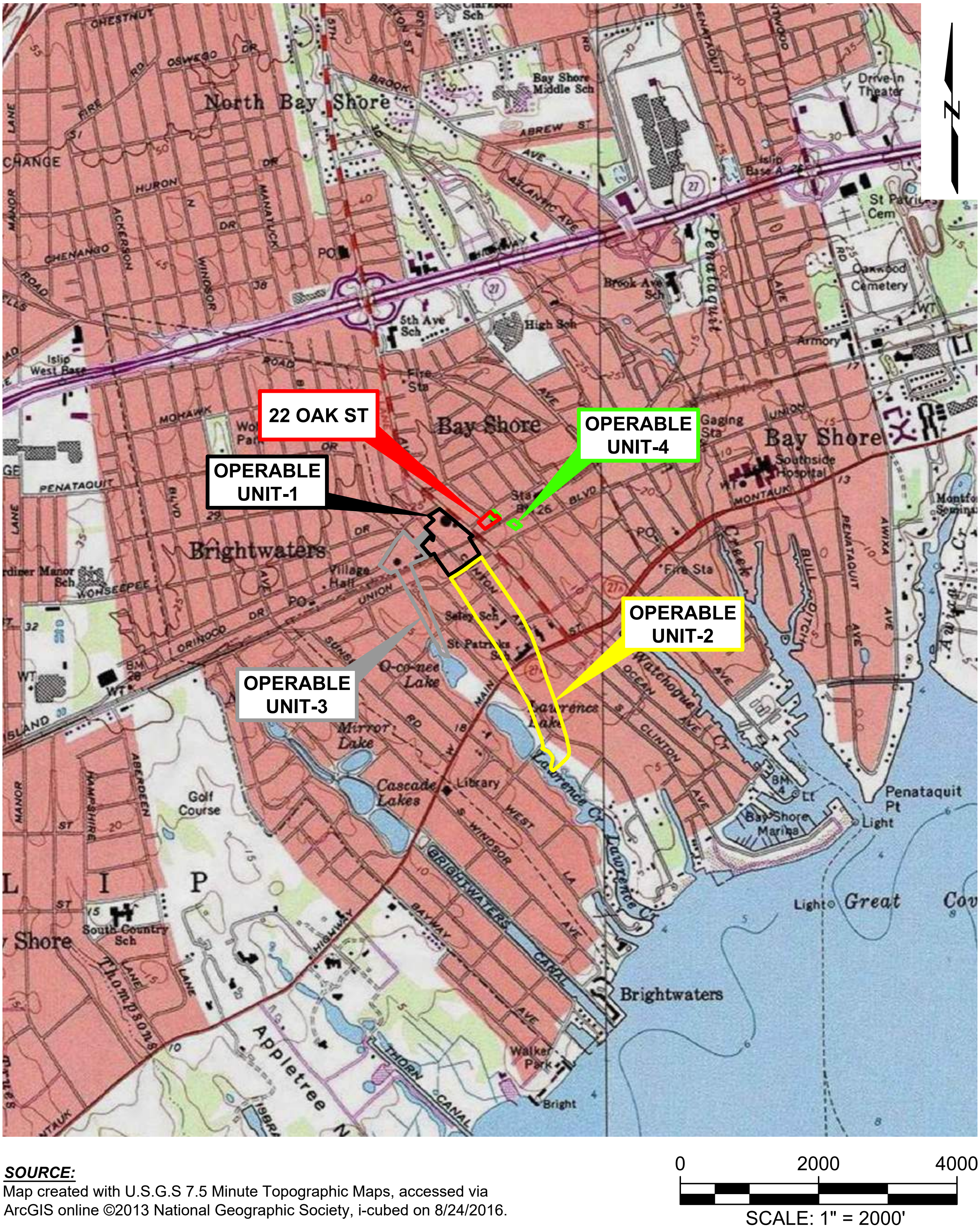
The control measures specified under each site condition can be implemented in any order that is most appropriate under the existing site conditions.

* control measures suggested in the New York State Department of Environmental Conservation *DER-10 / Technical Guidance for Site Investigation and Remediation*

VOC - volatile organic compound

mph - miles per hour

Figures



SOURCE:
Map created with U.S.G.S 7.5 Minute Topographic Maps, accessed via ArcGIS online ©2013 National Geographic Society, i-cubed on 8/24/2016.

Community Air Monitoring Plan
Bay Shore Former MGP Site
Bay Shore, New York

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SITE LOCATION MAP

Project 093180

April 2020

Fig. 1

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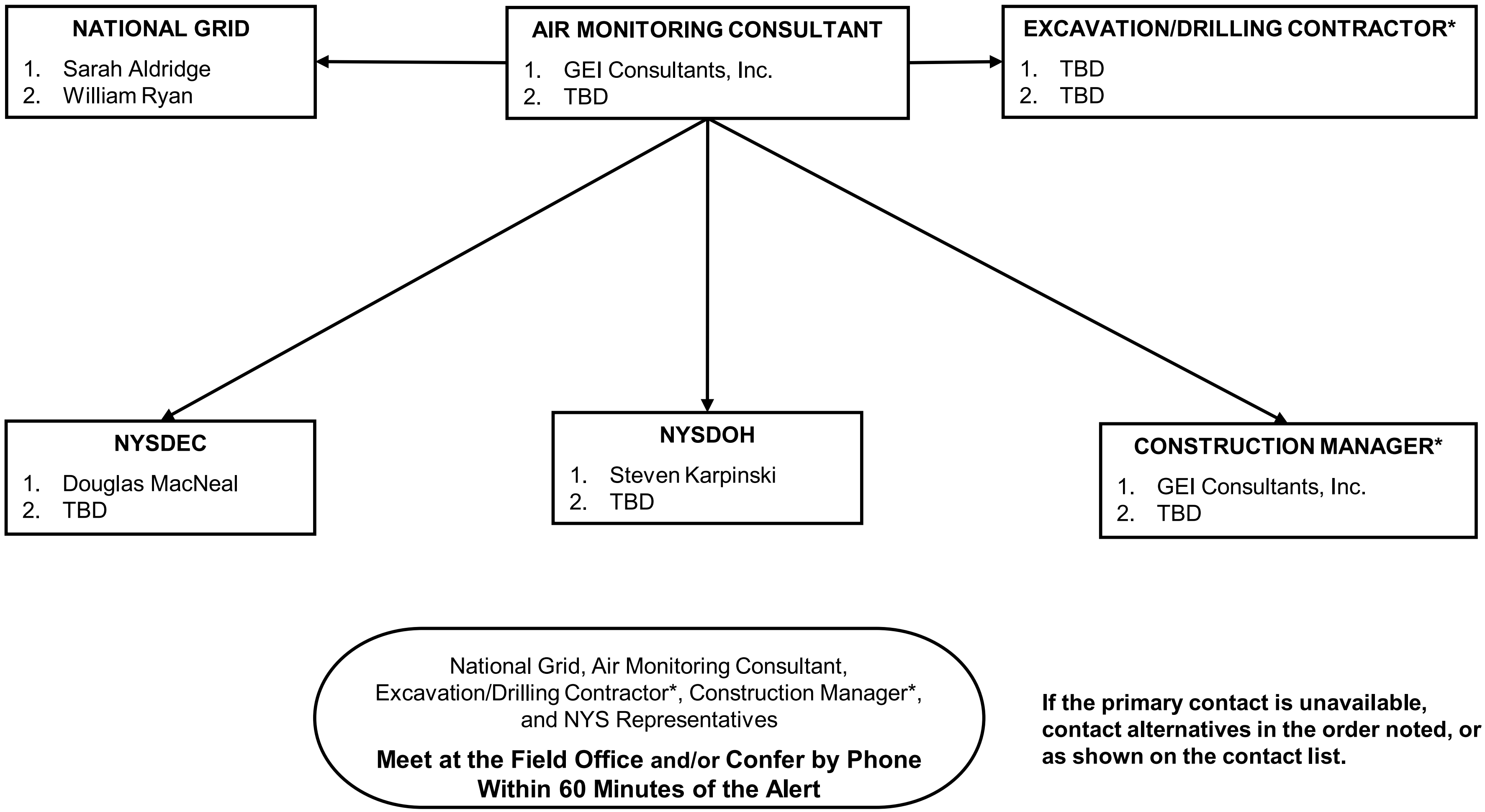

If the primary contact is unavailable, contact alternatives in the order noted, or as shown on the contact list.

NOTE:

TBD To Be Determined

* May not be applicable to all work completed at the site

COMMUNITY AIR MONITORING PLAN
BAY SHORE/BRIGHTWATERS FORMER MGP SITE
BAY SHORE, NEW YORK

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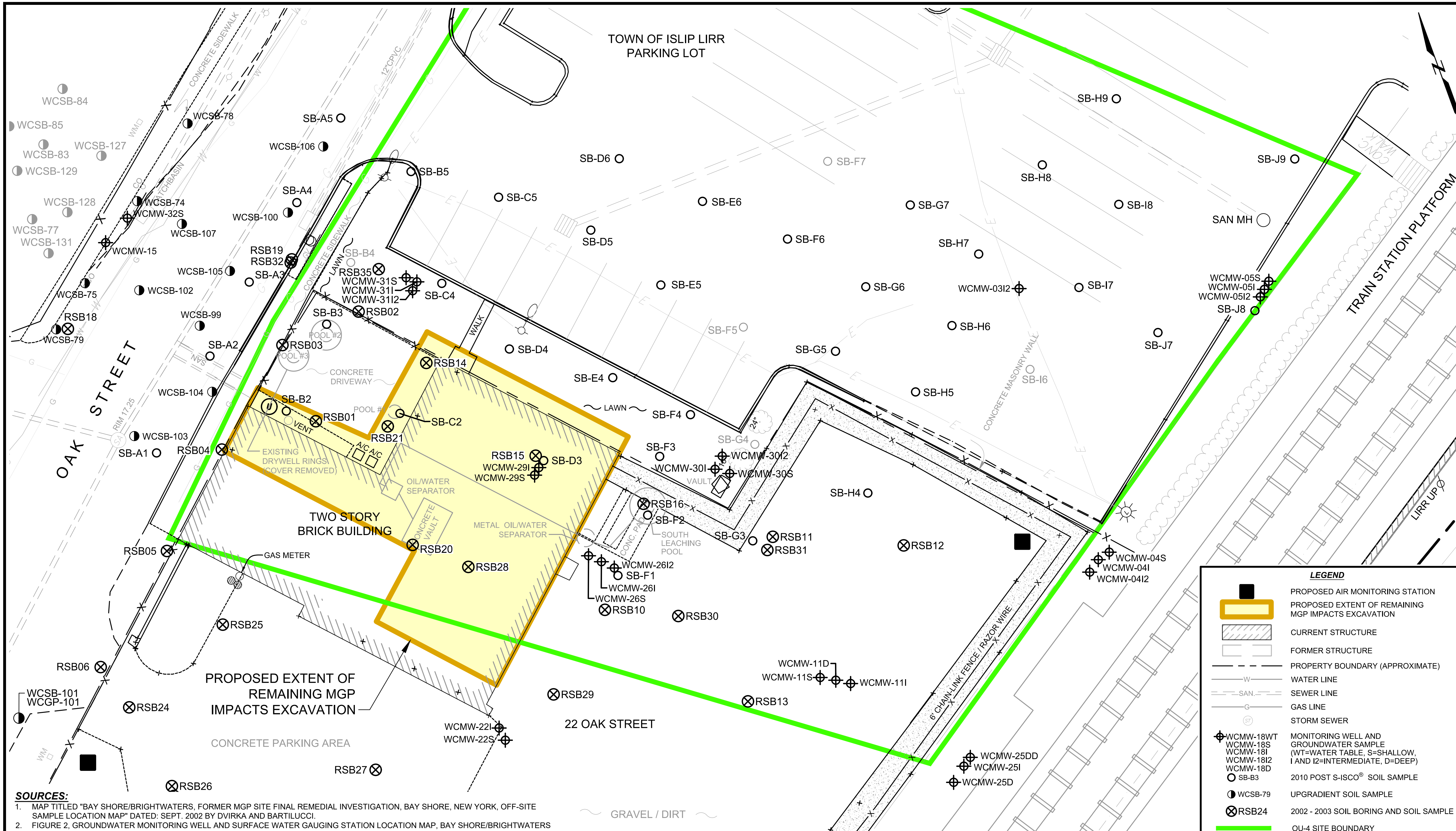
COMMUNICATION FLOWCHART

Project 093180 | April 2020 | Figure 2



LEGEND

	PROPOSED AIR MONITORING STATION
	PROPOSED EXTENT OF REMAINING MGP IMPACTS EXCAVATION
	CURRENT STRUCTURE
	FORMER STRUCTURE
	PROPERTY BOUNDARY (APPROXIMATE)
W	WATER LINE
SAN	SEWER LINE
G	GAS LINE
ST	STORM SEWER
WCMW-18WT WCMW-18S WCMW-18I WCMW-18I2 WCMW-18D	MONITORING WELL AND GROUNDWATER SAMPLE (WT=WATER TABLE, S=SHALLOW, I AND I2=INTERMEDIATE, D=DEEP)
SB-B3	2010 POST S-ISCO® SOIL SAMPLE
WCSB-79	UPGRADIENT SOIL SAMPLE
RSB24	2002 - 2003 SOIL BORING AND SOIL SAMPLE
	OU-4 SITE BOUNDARY

SOURCES:

1. MAP TITLED "BAY SHORE/BRIGHTWATERS, FORMER MGP SITE FINAL REMEDIAL INVESTIGATION, BAY SHORE, NEW YORK, OFF-SITE SAMPLE LOCATION MAP" DATED: SEPT. 2002 BY DVIRKA AND BARTILUCCI.
2. FIGURE 2, GROUNDWATER MONITORING WELL AND SURFACE WATER GAUGING STATION LOCATION MAP, BAY SHORE/BRIGHTWATERS FORMER MGP SITE, SCALE: 1"=200', DATED JANUARY 2004, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
3. DRAWING C-1, OFF-SITE SAMPLE LOCATION MAP, BAY SHORE/BRIGHTWATERS FINAL REMEDIAL INVESTIGATION, SCALE: 1"=200', DATED OCTOBER 15, 2003, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
4. PROPERTY BOUNDARY LOCATIONS WERE DETERMINED BY OTHERS USING AERIAL PHOTOGRAPHS AND TAX MAPS. PROPERTY BOUNDARIES ARE APPROXIMATE AND MONITORING WELLS LOCATED NEAR OR AT PROPERTY BOUNDARIES DEPICTED ON THE MAP ARE WITHIN THE ROAD RIGHT-OF-WAY.
5. SURVEY BY NELSON AND POPE, MELVILLE, N.Y. 11747-2188, DATED 5-20-08.
6. SURVEY BY NATIONAL GRID ENGINEERING AND SURVEY, INC. SURVEY DIVISION MAY 20, 2010.
7. SURVEY BY KS ENGINEERS, P.C., 494 BROAD STREET, NEWARK, N.J. 07102, DATED 9-10-10.

0 20 40

SCALE: 1" = 20'

Community Air Monitoring Plan
Bay Shore Former MGP Site
Bay Shore, New York

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TYPICAL AIR MONITORING STATION LOCATION PLAN

Project 093180 | April 2020 | Fig. 3

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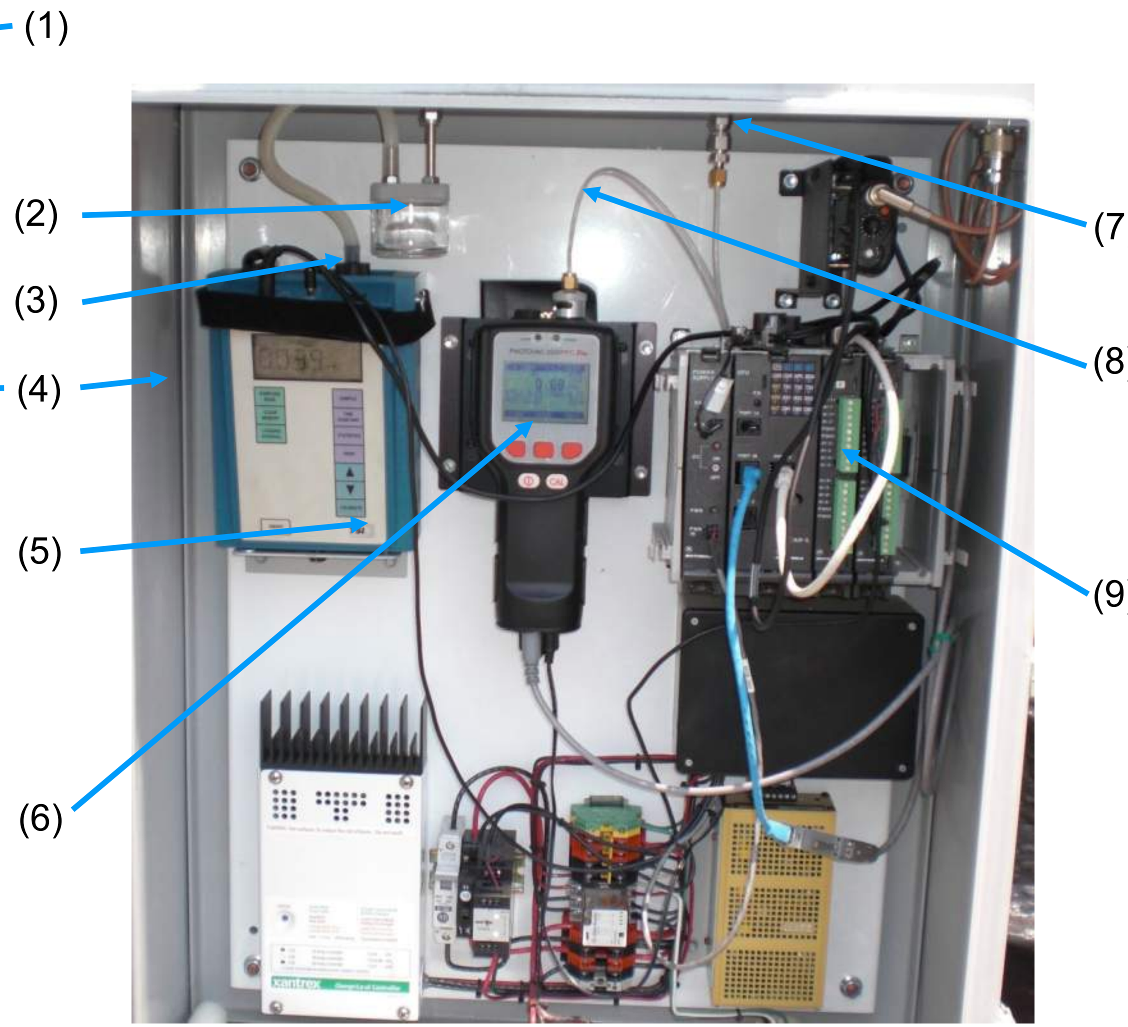

1. Solar Panel
2. DustTrak™ sample tubing with in-line condenser
3. DustTrak™ sample inlet with PM-10 impactor
4. Station enclosure
5. DustTrak™ Aerosol Monitor
6. PhotoVac™ 20/20 PID
7. PhotoVac™ 20/20 PID sample inlet
8. PhotoVac™ 20/20 PID sample inlet tubing
9. Data communications device

NOTE:
Figure depicts an AirLogics™, LLC Light air monitoring station as an example and may not be representative of the actual system or components that will be employed at the site

COMMUNITY AIR MONITORING PLAN
BAY SHORE/BRIGHTWATERS FORMER MGP SITE
BAY SHORE, NEW YORK

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EXAMPLE FIXED STATION INTERNAL COMPONENTS

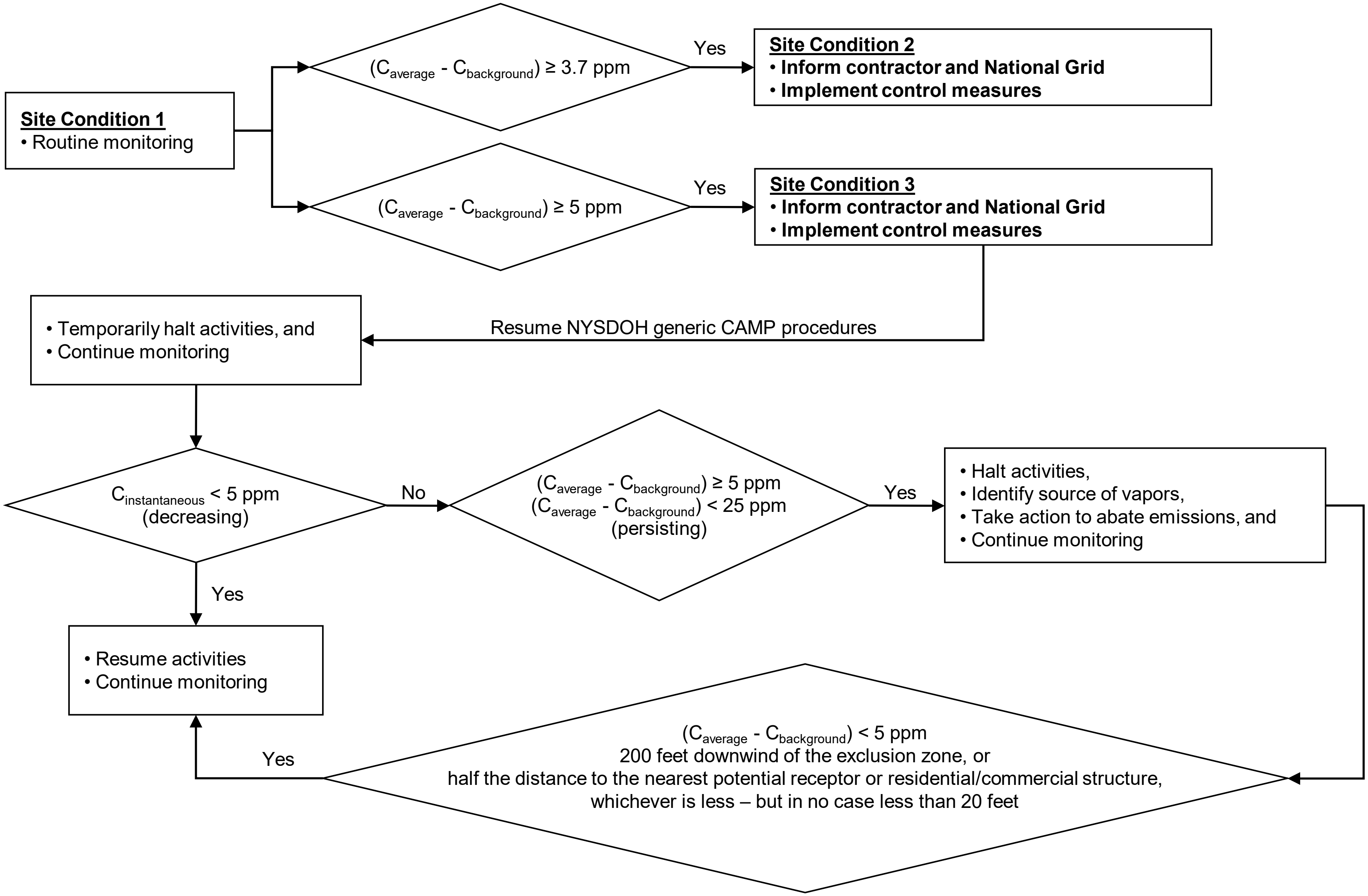
Project 093180	April 2020	Figure 4A

(1) (2) (3) (4)

1. MiniRAE 2000 PID Organic Vapor Anayzer (OVM)
2. DataRAM Particulate Monitor
3. DataRAM sample tubing
4. Station enclosure

NOTE:
Figure depicts a Pine Environmental air monitoring station as an example and may not be representative of the actual system or components that will be employed at the site

COMMUNITY AIR MONITORING PLAN BAY SHORE/BRIGHTWATERS FORMER MGP SITE BAY SHORE, NEW YORK	GEI Consultants	**EXAMPLE TRIPOD MOUNTED STATION INTERNAL COMPONENTS**	
nationalgrid	Project 093180	April 2020	Figure 4B



NOTES:

1. TVOC – Total Volatile Organic Compound
2. ppm – parts per million
3. $C_{average}$ = 15-minutes average concentration
4. $C_{background}$ = 15-minutes average concentration upwind
5. $C_{instantaneous}$ = 1-minute measured concentration

COMMUNITY AIR MONITORING PLAN
BAY SHORE/BRIGHTWATERS FORMER MGP SITE
BAY SHORE, NEW YORK

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TVOC DECISION DIAGRAM

Project 093180 | April 2020 | Figure 5

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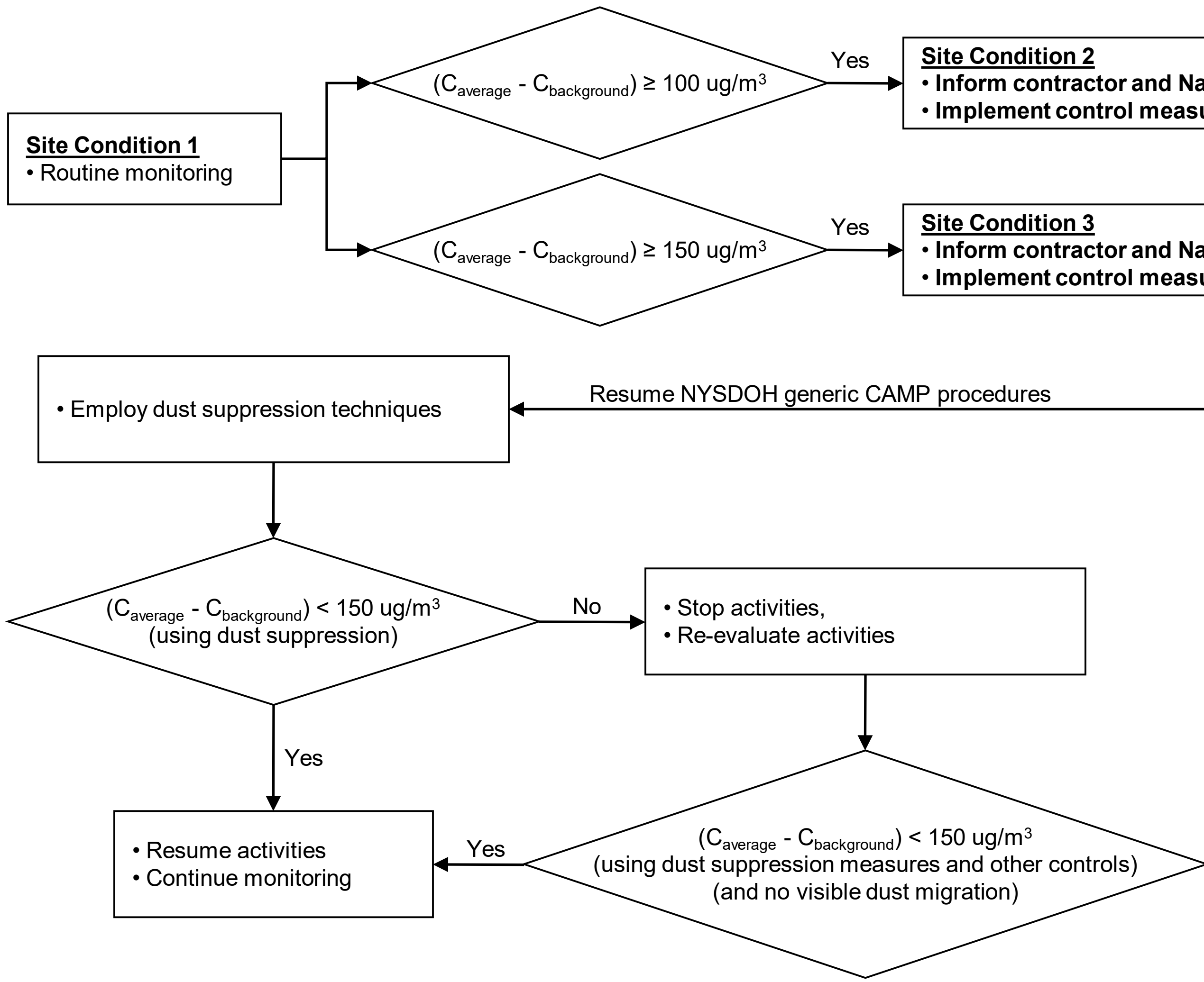

NOTES:

1. PM-10 – particulate matter
2. µg/m^3 – micrograms per cubic meter
3. $C_{average}$ = 15-minutes average concentration
4. $C_{background}$ = 15-minutes average concentration upwind
5. $C_{instantaneous}$ = 1-minute measured concentration

COMMUNITY AIR MONITORING PLAN
BAY SHORE/BRIGHTWATERS FORMER MGP SITE
BAY SHORE, NEW YORK

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PARTICULATE MATTER DECISION DIAGRAM

Project 093180 | April 2020 | Figure 6

H:\WPROC\Project\NationalGrid\Rockaway Park\SMP\Draft Interim SMP to NYSDEC\Appendices\Appendix C\RockawaySMP CAMP Fig 2-6.ppt

Appendix A

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix E

Health and Safety Plan

Geotechnical
Environmental
Water Resources
Ecological

Health and Safety Plan

Bay Shore/Brightwaters Former MGP Site
Town of Islip, Suffolk County
Bay Shore, New York

Submitted To:
National Grid
175 East Old Country Road
Hicksville, NY 11746

Submitted by:
GEI Consultants, Inc., P. C.
110 Walt Whitman Road
Huntington Station, NY 11746
631.760.9600

February 2015

Project No. 093180

Albert Jaroszewski, Sitewide Task Manager
Senior Project Manager/Hydrogeologist

Steven Hawkins, ASP
Regional Health and Safety Officer

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Tables

Appendices

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Abbreviations and Acronyms

ACGHI	American Conference of Government Industrial Hygienists
ACM	asbestos containing material
A.L.	action level
ANSI	American National Standards Institute
ASTM	American Society for Testing & Materials
BTEX	benzene, toluene, ethylbenzene, total xylenes
C	ceiling limit, not to be exceeded
CFR	Code of Federal Regulations
CGI	combustible gas indicator
CHSO	Corporate Health and Safety Officer
CMS	chip measurement system
CNS	central nervous system
CRF	Code of Federal Regulations
CVS	cardiovascular system
CRZ	Contamination Reduction Zone
CTPV	coal tar pitch volatiles
DEET	n,n-diethyl-meta-toluamide
DNAPL	dense non-aqueous phase liquid
EH	electrical hazard
eV	electron volt
EZ	Exclusion Zone
f/cc	fibers per cubic centimeter
FID	flame ionization detector
FP	flash point
GEI	GEI Consultants, Inc., P. C.
GFI	ground fault indicator
GI	gastro-intestinal
H&S	health and safety
HASP	Health and Safety Plan
HAZWOPER	hazardous waste operations and emergency response
HCN	hydrogen cyanide
HEPA	high efficiency particulate
Hr	Hour
H_2S	hydrogen sulfide
IDLH	Imminent Danger to Life & Health
IP	ionization potential
LEL	lower explosive limit
LIRR	Long Island Rail Road
MGP	manufactured gas plant

mg/m3	miligrams per cubic meter
Mm	Millimeter
mmHg	millimeters of mercury
Mph	miles per hour
MSDS	material safety data sheet
N/A	not applicable
NAPL	non-aqueous phase liquid
NIOSH	National Institute for Occupational Safety and Health
O_2	Oxygen
OM&M	operations, maintenance & monitoring
OSHA	Occupational Health and Safety Administration
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEL	permissible exposure level
PFD	personal flotation device
PID	photoionization detector
PM	Project Manager
PM-10	particulate meter
PPE	personal protective equipment
Ppm	parts per million
RWP	Roadway Worker Protection
SDS	Safety Data Sheets
SOP	Standard Operating Procedure
SPF	sun protection factor
SSO	Site Safety Officer
STEL	short-term exposure limit
SVOC	semivolatile organic compound
SZ	Support Zone
TLV	threshold limit value
TWA	time-weighted average
UEL	upper explosive limit
USCG	United States Coast Guard
UVA	ultraviolet A
UVB	ultraviolet B
VOC	volatile organic compound
VP	vapor pressure
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter

1. Emergency Contact Information

Table 1. Emergency Information

<table>
<tr><th colspan="2">Important Phone Numbers</th><th>Directions to Hospital and Occupational Health Clinic</th></tr>
<tr><td>Local Police:</td><td>911</td><td rowspan="12">Directions to North Shore University Hospital – South Side:

See Attached Map in Appendix A

Directions:
From the Orinoco Drive entrance to the Bay Shore Former MGP Site, turn right (south) onto Orinoco Drive. Make the first right onto Clinton Avenue and continue for 0.4 miles. Turn left onto East Main Street and continue for 0.5 miles. North Shore University Hospital – South Side will be on the left.

Directions to Occupational Health Clinic – Plainview Medical Group:

See Attached Map in Appendix A

Directions:

See Appendix A for Turn-by-Turn Directions to Plainview Medical Group.</td></tr>
<tr><td>Fire Department:</td><td>911</td></tr>
<tr><td>Ambulance:</td><td>911</td></tr>
<tr><td>State Police or County Sheriff:</td><td>911</td></tr>
<tr><td>North Shore University Hospital – South Side:
301 East Main Street
Bay Shore, NY 11706-8458</td><td>(631) 968-3000</td></tr>
<tr><td>Occupational Health Clinic – Plainview Medical Group
87 Cold Spring Road
Syosset, New York 11791</td><td>(516) 822-2541</td></tr>
<tr><td>Overall Project Manager
Errol Kitt</td><td>(631) 759-2964 office
(631) 513-7191 cell</td></tr>
<tr><td>Site-wide Task Manager
Al Jaroszewski</td><td>(631) 759-2963 office
(631) 481-5286 cell</td></tr>
<tr><td>Field Operations Manager
Christopher Morris</td><td>(631) 759-2967 office
(631) 484-9152 cell</td></tr>
<tr><td>Corporate Health and Safety Officer
Robin B. DeHate, Ph.D.</td><td>(813) 774-6564 office
(813) 323-6220 cell</td></tr>
<tr><td>Regional Health and Safety Officer
Steve Hawkins</td><td>(860) 368-5348 office
(860) 916-4167 cell</td></tr>
<tr><td>Client Contacts:
Bill Ryan

Terri Kelly

Ted Leissing

Diana Parisi</td><td>
(516) 545-2586 office
(516) 790-1660 cell

(516) 506-9109 cell

(516) 545-2563 office
(917) 734-3244 cell

(516) 545-2561 office
(917) 846-7441 cell</td></tr>
<tr><td colspan="3">Nearest Telephone Location: Onsite cellular</td></tr>
</table>

2. Background Information

2.1 General

Engineer	GEI Consultants, Inc., P. C. (GEI) 110 Walt Whitman Road, Suite 204 Huntington Station, NY 11746
Project Name	Bay Shore/Brightwaters Former MGP Site Town of Islip, Suffolk County Bay Shore, New York

This Health and Safety Plan (HASP) establishes policies and procedures to protect GEI personnel from the potential hazards posed by the activities at the Bay Shore/Brightwaters Former MGP Site, Town of Islip, Suffolk County, Bay Shore, New York. Reading of the HASP is required of on-site GEI personnel and will be reviewed by GEI subcontractors. Subcontractors will prepare their own Site-specific HASP and may use this as a guide. The plan identifies measures to minimize accidents and injuries, which may result from project activities or during adverse weather conditions. A copy of this HASP will be maintained on site for the duration of the work.

Included in Section 1 and Appendix A is a route to the nearest medical facility from the Site with directions and contact information. Safety data sheets (SDS, formerly known as Material Safety Data Sheets [MSDS]), specific to chemicals that may be encountered while working at the Site, are in Appendix B. Appendix C details the signs, symptoms, care and procedures to both heat and cold stress. Appendix D includes the Tailgate Safety Briefing form, the Project Safety Briefing form, the Accident/Incident Report Form and the Near Miss Reporting Form. Appendix E contains the GEI Health and Safety (H&S) Standard Operating Procedures (SOPs) that apply to this project.

2.2 Project Description

Activities conducted at the Bay Shore Former MGP Site consist of several tasks. These tasks include:

Operable Unit 1 (OU-1)

- Ozone Groundwater Treatment System Operations, Maintenance and Monitoring (OM&M). This includes groundwater sampling, soil vapor sampling, and ozone treatment system checks.

- Oxygen Injection System OM&M for the 60/66 North Clinton Ave, Union Boulevard and OU-1 North Oxygen Injection Systems.
- Gauging and Recovery of Dense Non-Aqueous Phase Liquid (DNAPL).
- Installation of recovery wells and associated investigation at the Taylor Rental property along Union Boulevard.

Operable Unit 2 (OU-2)

- Oxygen Injection System OM&M for the Clinton Avenue, Community Road, Montauk Highway, Manatuck Lane, and Plume Tail Systems.

Operable Unit 3 (OU-3)

- Oxygen Injection System OM&M for the Community Road System
- Installation of groundwater recovery points.
- Installation of a treatment system and associated piping.

Site-wide tasks involving all four operable units include:

- Groundwater Monitoring.
- Soil Vapor Monitoring which includes sampling soil vapor points associated with all oxygen injection systems.
- Community response sampling in area residences and businesses which may include soil vapor, ambient air, sump water and other sampling.

Additional tasks that may be conducted include:

- Oxygen injection and groundwater treatment system installation and/or abandonment.
- Additional site investigations (borings, groundwater probes, private property sampling).
- Subsurface injection of bioremediation products.
- Site maintenance (such as the refurbishment or restoration of monitoring well caps and pads, replacement of signs, repainting, etc.).
- Installation and/or abandonment of monitoring wells, DNAPL recovery wells, oxygen injection wells, and soil vapor points.

2.3 Site Description

The Bay Shore MGP opened as a gas plant in 1889 under the ownership of the Mutual Gas and Light Company. The Suffolk Gas and Electric Light Company owned and operated the site from 1889 to 1917. In 1918, the Long Island Lighting Company (LILCO) became the legal owner. Gas manufacturing occurred at the site between 1889 and approximately 1973. The plant was demolished in the mid-1970s. In 1918, LILCO began operating a carbureted water gas MGP. Later in the life of the plant, it was converted to an oil-gas MGP.

Manufacturing operations were conducted on the Bay Shore Property, while the Brightwaters Yard was used to support gas manufacturing and distribution operations. Further description of the site history can be found in the Final Remedial Investigation Report for the Bay Shore/Brightwaters Former MGP Site (January 2003).

In an effort to manage the remediation of the Bay Shore/Brightwaters former MGP site, the site has been divided into four operable units (OUs), including:

- **Operable Unit 1 –** Bay Shore Site, Bay Shore West Parcel and Adjacent Offsite Areas north of Union Boulevard
- **Operable Unit 2 –** Bay Shore Site Groundwater Plume
- **Operable Unit 3 –** Brightwaters Yard and Groundwater Plume
- **Operable Unit 4 –** Watchogue Creek/Crum's Brook

Work covered by this HASP may be performed within or near any of these operable units.

The oxygen injection systems have been added to the National Grid utility maps for the area and the underground utility notification system (New York 811).

3. Statement of Safety and Health Policy

GEI is committed to providing a safe and healthy work environment for its employees. To maintain a safe work environment, GEI has established an organizational structure and a Corporate Health and Safety Program to promote the following objectives:

- Reduce the risk of injury, illness, and loss of life to GEI employees.
- Maintain compliance with federal, state, and other applicable safety regulations; and minimize GEI employees' work exposure to potential physical, chemical, biological, and radiological hazards.

Safety policy and procedure on any one project cannot be administered, implemented, monitored, and enforced by any one individual. The total objective of a safe, accident free work environment can only be accomplished by a dedicated, concerted effort by every individual involved with the project from management down to all employees.

Each GEI employee must understand their value to the company; the costs of accidents, both monetary, physical, and emotional; the objective of the safety policy and procedures; the safety rules that apply to the safety policy and procedures; and what their individual role is in administering, implementing, monitoring, and compliance of their safety policy and procedures. This allows for a more personal approach to compliance through planning, training, understanding, and cooperative effort, rather than by strict enforcement. If for any reason an unsafe act persists, strict enforcement will be implemented.

4. Hazard/Risk Analysis

Physical hazards associated with heavy equipment, operation and maintenance of oxygen and ozone systems, and sampling operations are present. The heavy equipment associated with this project will include drilling and excavation equipment. Some of the hazards associated with this equipment include crushing of limbs, caught in-between, struck-by, slipping, tripping, or falling, and heavy lifting.

Contractors performing intrusive subsurface work should verify that electric, gas, water, steam, sewer, and other service lines are shut off, capped, or otherwise controlled, at or outside the building before demolition work is started. In each case, any utility company that is involved should be notified in advance by the Contractor, and its approval or services, if necessary, will be obtained.

Smoking is prohibited at or in the vicinity of hazardous operations or materials. Where smoking is permitted, safe receptacles will be provided for smoking materials. The hazards for this operation are listed in the following Activity Hazard Analysis and Site Hazards sections.

4.1 Personal Safety

Field activities have the potential to take employees into areas which may pose a risk to personal safety. The following websites (sources) have been researched to identify potential crime activity in the area of the project:

- www.spotcrime.com: Seven crimes were identified in the past 30 days within a mile of the Site.
- www.cityrating.com/crimestatistics.asp: Crime in Bay Shore is significantly less than the New York and national averages.
- www.mylocalcrime.com: Ten crimes identified in the past 30 days within a mile of the Site.

To protect yourself, take the following precautions:

- If deemed necessary by the Project Manager (PM), use the buddy system (teams of a minimum of two persons present);
- Let the Site Safety Officer (SSO) know when you begin work in these areas and when you leave;
- Call in regularly;

- Pay attention to what is going on around you; and
- If you arrive in an area and it does not look safe to get out of your vehicle, lock the doors and drive off quickly but safely.

Employees must not knowingly enter into a situation where there is the potential for physical and violent behaviors to occur. If employees encounter hostile individuals or a confrontation develops in the work area, suspend work activities, immediately leave the area of concern, and contact local 911 for assistance. Notify the SSO and Corporate Health and Safety Officer (CHSO) of any incidents once you are out of potential danger.

In the event of an emergency, prompt communications with local emergency responders is essential. At least one charged and otherwise functioning cell phone to facilitate emergency communications will be onsite. Confirmation of cellular phone operation will be confirmed at the start of each working day.

4.2 Site and Activity Hazard Analysis

The potential hazards for this project have been categorized into Site and Activity Hazards. Site Hazards are those hazards associated with Site conditions and Activity Hazards are associated with GEI onsite activities. The potential hazards and control measures established to reduce the risk of injury or illness are identified in Table 2. Safe operating procedures established for routine hazards and common Site conditions are included in the table below, or contained in the GEI Corporate Health and Safety Manual or the GEI H&S SOPs (Appendix E).

Table 2. Activity Hazards

Activity Hazard: Entering a Construction Site		
Activity	**Potential Hazard**	**Control Measure(s)**
Mobilization/ Demobilization	Construction/Heavy Equipment Safety	• Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or (electrical hazard) EH-rated safety boots with composite toe and shank; safety glasses; nitrile/neoprene gloves; and earplugs. • Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations. • Coordinate hand signals with operators. • Stay Alert! Pay attention to equipment backup alarms and swing radii. • Wear a high-visibility, reflective vest when working near equipment or motor vehicle traffic. • Position yourself in a safe location when filling out logs talking with the contractor. • Notify the contractor immediately if any problems arise. • Do not stand or sit under suspended loads or near any pressurized equipment lines. • Do not operate cellular telephones in the vicinity of heavy equipment operation.
	Insect Bites	• Use insect repellant. Avoid areas where insects may be prevalent.
	Slips, Trips, and Falls	• Keep trafficked areas free from slip/trip/fall hazards. • Maintain weed growth in sampling areas, especially on slopes. • Wear shoes with traction. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to sampling areas, on steeply sloped areas, or where steep areas must be traversed to arrive at sample points.
	Electrical Substation Interior	• Wear proper personal protective equipment (PPE) including flame resistant clothing when working within the substation. • Follow Occupational Safety and Health Agency (OSHA) guidelines for working distance to equipment.
	Heavy Lifting	• User proper lifting techniques. • Ask fellow worker for help.

Table 2. Activity Hazards

Activity Hazard: Drilling		
Task	**Potential Hazard**	**Control Measure(s)**
Soil Logging	Heavy Equipment	• Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or EH-rated safety boots with composite toe and shank; safety glasses; nitrile/neoprene gloves; and earplugs. • Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations. • Coordinate hand signals with operators. • Stay Alert! Pay attention to equipment backup alarms and swing radii. • Wear a high-visibility, reflective vest when working near equipment or motor vehicle traffic. • Position yourself in a safe location when filling out logs talking with the contractor. • Notify the contractor immediately if any problems arise. • Do not stand or sit under suspended loads or near any pressurized equipment lines. • Do not operate cellular telephones in the vicinity of heavy equipment operation.
	Vehicular Traffic	• Wear high-visibility, reflective vest at all times. • Use cones, flags, barricades, and caution tape to define work area. • Use a "spotter" to locate oncoming vehicles. • Use vehicle to block work area. • Engage police detail if needed.
	Poisonous Plants	• Avoid areas infested with poisonous plants. • Use a barrier cream to provide some protection. • Wash exposed clothing separately in hot water with detergent. • After use, clean tools, and soles of boots with rubbing alcohol or soap and lots of water. • Immediately wash with soap and water any areas that come into contact with poisonous plants. • If exposed to a poisonous plant, wash with soap and water or a product such as Technu™. First aid kits are available in the company vehicles. • See SOP HS-001

Activity Hazard: Drilling (Cont.)		
Task	**Potential Hazard**	**Control Measure(s)**
Soil Logging (Cont.)	Heat Stress	• Increase water intake while working. • Increase number of rest breaks and/or rotate workers in shorter work shifts. Rest in cool, dry areas. • Watch for signs and symptoms of heat exhaustion and fatigue. • Plan work for early morning or evening during hot months. • Use ice vests when necessary. • In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures. • See Appendix C of the HASP
	Wild Animals	• Avoid contact with wild animals.
Soil Logging (Cont.)	Slips, Trips, and Falls	• Wear PPE that properly fits, is in good condition and appropriate for the activities and hazards. • Maintain good visibility of the work area. • Avoid walking on uneven, steeply sloped or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Maintain weed growth in sampling areas, especially on slopes. • Wear shoes with traction. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to sampling areas, on steeply sloped areas, or where steep areas must be traversed to arrive at sample points.
	Insect Bites	• Use insect repellant. Avoid areas where insects may be prevalent.
	Heavy Lifting / Strains and Sprains	• User proper lifting techniques. • Ask fellow worker for help.
	Chemical / Contaminant Exposure – Skin and eye injury/irritation	• Wear protective coveralls (e.g. Tyvek ®) with shoe covers, safety glasses, face shield, Nitrile gloves. • Dispose of gloves after use and wash hands. • Avoid contact with pooled liquids and limit contact with contaminated soils/groundwater.

Activity Hazard: Groundwater and Soil Vapor Monitoring		
Task	**Potential Hazard**	**Control Measure(s)**
Core Sampling	Cuts and Lacerations	• The core sampling program may require employees to use powered cutting tools (circular saw or shears) or a hooked knife to cut open the sample liner. • Safety box cutters will be utilized for routine operations such as opening boxes of supplies or cutting rope or string. • When using cutting tools, follow the safety precautions listed below: • Keep free hand out of the way. • Secure work if cutting through thick material. • Use only sharp blades; dull blades require more force that results in less knife control. • Pull the knife toward you; pulling motions are easier to manage. • Do not put the knife in your pocket. • Wear leather or Kevlar® gloves when using knives or blades, or when removing sharp objects caught or dangling in sampling gear.
Groundwater and Soil Vapor Sample Collection	Vehicular Traffic	• Wear high-visibility, reflective vest at all times. • Use cones, flags, barricades, and caution tape to define work area. • Use a "spotter" to locate oncoming vehicles. • Use vehicle to block work area. • Engage police detail if needed.
Groundwater and Soil Vapor Sample Collection	Chemical / Contaminant Exposure – Skin and eye injury/irritation	• Wear protective coveralls (e.g. Tyvek ®) with shoe covers, safety glasses, face shield, Nitrile gloves. • Dispose of gloves after use and wash hands. • Avoid contact with pooled liquids and limit contact with contaminated soils/groundwater.
	Insect Bites	• Use insect repellant. Avoid areas where insects may be prevalent.

Activity Hazard: Groundwater and Soil Vapor Monitoring (Cont.)		
Task	**Potential Hazard**	**Control Measure(s)**
Groundwater and Soil Vapor Sample Collection	Slips, Trips, and Falls	• Wear PPE that properly fits, is in good condition and appropriate for the activities and hazards. • Maintain good visibility of the work area. • Avoid walking on uneven, steeply sloped or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Maintain weed growth in sampling areas, especially on slopes. • Wear shoes with traction. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to sampling areas, on steeply sloped areas, or where steep areas must be traversed to arrive at sample points.
	Electrical Substation Interior	• Wear proper personal protective equipment (PPE) including flame resistant clothing when working within the substation. • Follow Occupational Safety and Health Agency (OSHA) guidelines for working distance to equipment.
	Heavy Lifting – Back Injury, Strains and Sprains	• Use proper lifting techniques. • Ask fellow worker for help. • Use a mechanical lifting device or a lifting aid where appropriate. • If you must lift, plan the lift before doing it. • Check your route for clearance. • Bend at the knees and use leg muscles when lifting. • Use the buddy system when lifting heavy or awkward objects. • Do not twist your body while lifting.

Groundwater and Soil Vapor Sample Collection	Poisonous Plants	• Avoid areas infested with poisonous plants. • Use a barrier cream to provide some protection. • Wash exposed clothing separately in hot water with detergent. • After use, clean tools, and soles of boots with rubbing alcohol or soap and lots of water. • Immediately wash with soap and water any areas that come into contact with poisonous plants. • If exposed to a poisonous plant, wash with soap and water or a product such as Technu™. First aid kits are available in the company vehicles. • See SOP HS-001
	Heat Stress	• Increase water intake while working. • Increase number of rest breaks and/or rotate workers in shorter work shifts. Rest in cool, dry areas. • Watch for signs and symptoms of heat exhaustion and fatigue. • Plan work for early morning or evening during hot months. • Use ice vests when necessary. • In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures. • See Appendix C of the HASP
	Wild Animals	• Avoid contact with wild animals.
Waste Characterization Sampling	Chemical / Contaminant Exposure – Skin and eye injury/irritation	• Wear protective coveralls (e.g. Tyvek ®) with shoe covers, safety glasses, face shield, Nitrile gloves. • Dispose of gloves after use and wash hands. • Avoid contact with pooled liquids and limit contact with contaminated soils/groundwater.
	Cuts or Abrasions (Handling Drums)	• Wear work gloves over nitrile gloves.

Activity Hazard: Groundwater and Soil Vapor Monitoring (Cont.)		
Task	**Potential Hazard**	**Control Measure(s)**
Waste Characterization Sampling (Cont.)	Vehicular Traffic	• Wear high-visibility, reflective vest at all times. • Use cones, flags, barricades, and caution tape to define work area. • Use a "spotter" to locate oncoming vehicles. • Use vehicle to block work area. • Engage police detail if needed.
	Cold Stress – Hypothermia, Frostbite	• Take breaks in heated shelters when working in extremely cold temperatures. • Drink warm liquids to reduce the susceptibility to cold stress. • Wear protective clothing (recommended three layers: an outside layer to break the wind, a middle layer to provide insulation, and an inner layer of cotton of synthetic weave to allow ventilation). • Wear a hat and insulated boots. • Keep a change of dry clothing available in case clothes become wet. • Do heavy work during the warmer parts of the day and take breaks from the cold. • If possible shield work areas from drafts of wind and use insulating material on equipment handles when temperatures are below 30°F • Watch for symptoms of cold stress. (see Appendix C in HASP)
Drum Removal	Chemical / Contaminant Exposure – Skin and eye injury/irritation	• Wear protective coveralls (e.g. Tyvek ®) with shoe covers, safety glasses, face shield, Nitrile gloves. • Dispose of gloves after use and wash hands. • Avoid contact with pooled liquids and limit contact with contaminated soils/groundwater.
	Cuts or Abrasions (Handling Drums)	• Wear work gloves over nitrile gloves.
	Heavy Lifting – Back Injury, Strains and Sprains	• Use proper lifting techniques. • Ask fellow worker for help. • Use a mechanical lifting device or a lifting aid where appropriate. • If you must lift, plan the lift before doing it. • Check your route for clearance. • Bend at the knees and use leg muscles when lifting. • Use the buddy system when lifting heavy or awkward objects. • Do not twist your body while lifting.

Activity Hazard: DNAPL Gauging and Recover		
Task	**Potential Hazard**	**Control Measure(s)**
Dense Non-Aqueous Phase Liquid (DNAPL) Gauging and Recovery	Repetitive Motion Injury (Standing, Squatting, and Bending Over)	• Take regular breaks and do not work in unusual positions for long periods of time. • Walk and stretch between tasks.
	Chemical / Contaminant Exposure – Skin and eye injury/irritation	• Wear protective coveralls (e.g. Tyvek ®) with shoe covers, safety glasses, face shield, Nitrile gloves. • Dispose of gloves after use and wash hands. • Avoid contact with pooled liquids and limit contact with contaminated soils/groundwater.
	Slips, Trips, and Falls	• Wear PPE that properly fits, is in good condition and appropriate for the activities and hazards. • Maintain good visibility of the work area. • Avoid walking on uneven, steeply sloped or debris ridden ground surfaces. • Plan tasks prior to preforming them including an activity hazard analysis. • Keep trafficked areas free from slip/trip/fall hazards. • Maintain weed growth in sampling areas, especially on slopes. • Wear shoes with traction. • Avoid traversing steep areas in slippery conditions. • Do not carry heavy objects to sampling areas, on steeply sloped areas, or where steep areas must be traversed to arrive at sample points.
	Electrical Substation Interior	• Wear proper personal protective equipment (PPE) including flame resistant clothing when working within the substation. • Follow Occupational Safety and Health Agency (OSHA) guidelines for working distance to equipment.

Personal Protective Equipment (PPE) is the initial level of protection based on the activity hazards and Site conditions which have been identified. Upgrades to respiratory protection may be required based on the designated Action Levels found in Section 9. General onsite provisions will include: extra nitrile, leather, and/or Kevlar gloves, extra protective coveralls (e.g. Tyvek®) with boot covers, drinking water and electrolyte fluids, reflective vest, first aid kit, fire extinguisher, hearing protection, and washing facilities.

If Site conditions suggest the existence of a situation more hazardous than anticipated, the Site personnel will evacuate the immediate area. The hazard, the level of precautions, and the PPE will then be reevaluated with the assistance and approval of the CHSO (Robin DeHate) and the Site-Wide Task Manager (TM) Al Jaroszewski.

4.2.1 Handling Drums and Containers

Regulations for handling drums and containers are specified by Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(j). Potential hazards associated with handling drums include vapor generation, fire, explosions, and possible physical injury. Handling of drums/containers during the Site investigation and remediation activities may be necessary. If drum/container handling is necessary, it will be performed in accordance with applicable regulations.

4.2.2 Electrical Hazards

4.2.2.1 Electric Substations

Electrical hazards are typically the most serious physical hazards associated with working on or **near an electric substation**. Although the scope of work for this HASP occurs along the property lines and not in the substation proper, measures to mitigate exposure to overhead and subsurface electrical transmission and distribution lines should still be considered:

- Contact Dig Safely – New York for mark out of underground public utilities.
- Obtain the most recent as-built drawings of the transmission/distribution line layout from utility owner.
- Mark out of underground transmission/distribution lines by utility owner's survey/mark out personnel.
- Conduct work under the supervision of a National Grid Health and Safety representative or their designee.
- Use hand digging tools specifically designed for use on substation property (i.e., insulated digging bar, long-handled spoon shovel, etc.). In addition, rubber gloves and Fire-Resistant clothing are required if hand digging in a substation in/or around energized conductors, which is not anticipated to be the case.
- Use insulated lineman's gloves.
- Electrical Hazard (EH)-rated footwear is required when working on or around electrical equipment over 50 volts, or in an area of expected downed wires.
- Avoid carrying tools/equipment above waist height if overhead electric hazards exist.
- Ground vehicles or equipment using 4-aught gauge grounding cable.
- Maintain a minimum clearance of 16 feet from bus bars, transformer/capacitor electrodes, and overhead transmission/distribution lines.

- Maintain a minimum offset of 3 feet from marked underground transmission/ distribution lines.
- Avoid working on substation in conditions of high humidity or rain or thunderstorms.
- Stop work immediately and vacate the work area in the event lightning is observed.

4.2.2.2 Utilities

The Site may have shallow, buried utilities and also overhead utilities in certain areas. It will be necessary for parties disturbing the existing ground surface and conducting operations with heavy equipment having high clearances to exercise caution in performing project-related work with respect to the presence of utilities. Utility companies with active, buried lines in the Site area will be asked by the Contractor performing intrusive activities to mark their facilities. Employees will use these data to choose work locations.

4.2.2.3 Underground Utilities

No excavating, drilling, boring, or other intrusive activities will be performed until an underground utility survey, conducted by knowledgeable persons or agencies, has been made. This survey will identify underground and in-workplace utilities such as the following:

- Electrical lines and appliances;
- Telephone lines;
- Cable television lines;
- Gas lines;
- Pipelines;
- Steam lines;
- Water lines;
- Sewer lines; and/or
- Pressurized air lines.

The location of utilities will be discussed with GEI employees and subcontractors during a Site Safety Briefing. Identified utilities should be marked or access otherwise restricted to avoid chance of accidental contact.

Even when a utility search has been completed, drilling, boring, and excavation should commence with caution until advanced beyond the depth at which such utilities are usually located. Utilities will be considered “live” or active until reliable sources demonstrate otherwise.

4.2.2.4 Overhead Utilities

Overhead transmission and distribution lines will be carried on towers and poles which provide adequate safety clearance over roadways and structures. Clearances will be adequate for the safe movement of vehicles and for the operation of construction equipment.

Overhead or above-ground electric lines should be considered active until a reliable source has documented them to be otherwise. Elevated work platforms, ladders, scaffolding, man-lifts, and drill or vehicle superstructures will be erected a minimum of 20 feet (the actual distance is dependent upon the voltage of the line) from overhead electrical lines until the line is de-energized, grounded, or shielded so arcing cannot occur between the work location or superstructure.

4.2.3 Precautions for Working in Confined Spaces

Work in confined spaces will be performed in accordance with 29 CFR 1910.146 (effective April 15, 1993), and GEI Permit Required Confined Space Entry program. The PM will work with the CHSO to address confined space issues as applicable prior to the start of the project. A confined space entry number will be obtained from the CHSO before entering space. The PM will contact local emergency responders to make arrangements for potential rescue. This correspondence will be documented and submitted to the CHSO. Copies of the standards will be kept on file in GEI's main office. Confined space work will not be performed without first notifying and receiving approval from the CHSO.

4.2.4 Excavations and Trenches

The safety requirements for excavations and trenches must be determined by a competent person who is capable of identifying existing and predictable hazards and work conditions that are unsanitary, hazardous, or dangerous to GEI employees. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions. GEI employees will not enter trenches.

The following are general requirements for work activities in and around excavations:

- Prior to initiation of excavation activity (or ground intrusive activity, such as drilling), the location of underground installations will be determined. The <One-Call/Dig-Safe> center will be contacted by the Contractor/Subcontractor a minimum of 72 hours prior to excavation activities. It may also be necessary to temporarily support underground utilities during excavation. When excavations approach the estimated location of underground installations, the exact location of the underground installations will be determined by means that are safe for GEI employees, i.e., hand dig, test pits, etc.

- Excavations should be inspected daily by the excavating company's competent person prior to commencement of work activities. Evidence of cave-ins, slides, sloughing, or surface cracks or excavations will be cause for work to cease until necessary precautions are taken to safeguard employees.
- Excavated and other materials or equipment that could fall or roll into the excavation, and vehicular traffic and heavy equipment will be placed at least 5 feet from the edge of the excavation.
- Excavation operations will cease immediately during hazardous weather conditions such as high winds, heavy rain, lightning, and heavy snow.

Employees will refer to GEI's Excavation Safety SOP for further information.

4.2.5 Fire and Explosion

When conducting excavating activities, the opportunity for encountering fire and explosion hazards exists from contamination in soil and the possibility of free product in underground structures and pipelines. Additionally, the use of diesel-powered excavating equipment could present the possibility of encountering fire and explosion hazards.

4.2.6 Heat Stress

Employees may be exposed to the hazards associated with heat stress when ambient temperatures exceed 70ºF. Employees should increase water intake while working in conditions of high heat. Enough water should be available so that each employee can consume 1 quart of water per hour. In addition, they should increase number of rest breaks and/or rotate employees in shorter work shifts. Employees should rest in cool, dry, shaded areas for at least 5 minutes. Employees should not wait until they feel sick to cool down. Watch for signs and symptoms of heat exhaustion and fatigue. In the event of heat stroke, bring the victim to a cool environment, call for help, and initiate first aid procedures.

The procedures to be followed regarding avoiding heat stress are provided in Appendix C – Heat Stress Guidelines and in GEI's Heat Stress program.

4.2.7 Cold Stress

Employees may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, and poor judgment. The procedures to be followed regarding avoiding cold stress are provided in Appendix C – Cold Stress Guidelines and in GEI's Cold Stress program.

4.2.8 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. Employees who will perform suspected or established high noise tasks and operations for short durations (less than 1-hour) will wear hearing protection. If deemed necessary by the SSO, the CHSO will be consulted on the need for additional hearing protection and the need to monitor sound levels for Site activities. Other employees who do not need to be in proximity of the noise should distance themselves from the equipment generating the noise.

4.2.9 Hand and Power Tools

In order to complete the various tasks for the project, personnel may use hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel when using hand and power tools and Ground Fault Indicator (GFI)-equipped circuits will be used for power tools.

4.2.10 Slips, Trips, and Falls

Working in and around the Site may pose slip, trip, and fall hazards due to slippery and uneven surfaces. Excavation at the Site may cause uneven footing in trenches and around the soil piles. Steep slope and uneven terrain conditions at the Site are also a primary concern. GEI employees will wear proper foot gear and will employ good work practice and housekeeping procedures to minimize the potential for slips, trips, and falls.

4.2.11 Manual Lifting

Manual lifting of objects and equipment may be required. Failure to follow proper lifting technique can result in back injuries and strains. Employees should use a buddy system and/or power equipment to lift heavy loads whenever possible and should evaluate loads before trying to lift them (i.e., they should be able to easily tip the load and then return it to its original position). Carrying heavy loads with a buddy and proper lifting techniques include: 1) make sure footing is solid; 2) make back straight with no curving or slouching; 3) center body over feet; 4) grasp the object firmly and as close to your body as possible; 5) lift with legs; and 6) turn with your feet, don’t twist.

4.2.12 Projectile Objects and Overhead Dangers

Overhead dangers, including but not limited to falling debris and equipment, can occur while operating drill rigs. GEI employees will maintain a minimum distance from large overhead operations and to maintain proper communication with heavy equipment operators and their handlers, should work necessitate their presence beyond the minimum safety distance. Proper PPE will be worn during these types of activities including steel-toed/shank boots, safety vests, and hard hats.

4.2.13 Cuts and Lacerations

The sampling program may require employees to use powered cutting tools (circular saw or shears) or a hooked knife to cut open the sample liner. Safety box cutters will be utilized for routine operations such as opening boxes of supplies or cutting rope or string. When using cutting tools, follow the safety precautions listed below:

- Keep free hand out of the way.
- Secure work if cutting through thick material.
- Use only sharp blades; dull blades require more force that results in less knife control.
- Pull the knife toward you; pulling motions are easier to manage.
- Do not put the knife in your pocket.
- Wear leather or Kevlar® gloves when using knives or blades, or when removing sharp objects caught or dangling in sampling gear.

4.2.14 Working with Ladders and on Scaffolding

GEI employees may be required to use ladders or scaffolding to access equipment of work areas. GEI has developed SOPs for working with ladders (SOP No. HS-011) and scaffolding (SOP No. HS-023). The SOPs should be reviewed in the project planning stage and at the project execution stage.

For each project/task the proper ladder needs to be selected. Prior to each use, a ladder needs to be inspected and used in accordance with 29 CFR 1926.1053, as applicable. Copies of the standards will be kept on file in GEI’s main office.

If work on scaffolding is required, it will be performed in accordance with 29 CFR 1926.451, as applicable. Copies of the standards will be kept on file in GEI’s main office. Work on scaffolds will not be performed without first notifying and receiving approval from the CHSO. A competent person should supervise the erection, modification, and disassembly of scaffolds. GEI employees may not act as the competent person.

4.2.15 Fall Protection

A Fall Protection Plan must be developed when GEI employees are working at heights above 5 feet. The Fall Protection Plan template can be found on the Health and Safety page of the GEI intranet. This plan must be submitted to the CHSO for approval and will be attached to this HASP as an appendix.

4.2.16 Working Near Water

The buddy system will be used when working near water, in which two persons operate as a single unit in order to monitor and assist each other in performing tasks. Personnel must be attired in a United States Coast Guard (USCG)-approved Type III or Type V work vest. The vest must be properly sized for the individual and must be secured. A throwable rescue device (Type IV personal flotation device [PFD] flotation aid) along with whatever equipment (i.e., ladders, lifting gear, or rescue boat) necessary will be immediately available to recover an individual from the water.

Waders may not be worn when working along, over, or in moving waters; or in waters influenced by tides or acted upon by waves when water depths exceed knee height unless specifically approved by the CHSO. Waders may be worn in still waters and in water depths up to the waist, if bottom conditions are firm and well understood. Waders should never be worn aboard a watercraft.

Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water's edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. Employees should limit access to areas where these slip/fall hazards exists, especially in locations containing tidal water flow.

4.3 Chemical Hazards

The characteristics of compounds at the Site are discussed below for information purposes. Adherence to the safety and health guidelines in this HASP should reduce the potential for exposure to the compounds discussed below.

4.3.1 Volatile Organic Compounds

Volatile organic chemicals (VOCs), such as benzene, toluene, ethyl benzene, and xylene (BTEX) are present as soil and groundwater contaminants, and in some cases chemical components in non-aqueous phase liquids (NAPL) such as oil or tar within soils and abandoned pipelines. These compounds generally have a depressant effect on the Central Nervous System (CNS), may cause chronic liver and kidney damage, and some are suspected human carcinogens. Benzene is a known human carcinogen. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation. The primary route of exposure to VOCs is through inhalation and therefore respiratory protection is the primary control against exposure to VOCs.

4.3.2 Coal Tar and Coal Tar Products

Coal tar products, which are semi-volatile organic compounds (SVOCs) consist of a mixture of acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluorethene, benz(a)pyrene, benzo(e)pyrene, benzo(g,h,i)peryline, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3cd)pyrene, 2-methyl naphthalene, naphththalene, phenanthrene, phenols, pyrene.

Coal tar products and other SVOCs are present at the Site within impacted soil and groundwater and as a dense non-aqueous phase liquid (DNAPL) by-product of gas production within soils, former manufactured gas plant (MGP) structures, and abandoned pipelines.

Coal tar products such as those listed above may cause contact dermatitis. Direct contact can be irritating to the skin and produce itching, burning, swelling, and redness. Direct contact or exposure to the vapors may be irritating to the eyes. Conjunctivitis may result from prolonged exposure. Coal tar is considered to be very toxic, if ingested. High levels of exposure to coal tar, though not anticipated during work activities conducted during this project, may increase the risk of cancer including lung, kidney, and skin cancer. Naphthalene is also an eye and skin irritant and can cause nausea, headache, fever, anemia, liver damage, vomiting, convulsions, and coma. Poisoning may occur by ingestion of large doses, inhalation, or skin absorption.

The major route of entry for the work activities to be conducted at this Site is through direct contact. Exposure is most likely when handling soil and water samples. Inhalation may occur when the soil is disturbed causing respirable and nuisance dust particles to become airborne.

4.3.3 Heavy Metals

Exposure to high concentrations of **arsenic** can cause dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, and hyperpigmentation of skin. Chronic exposure to arsenic has resulted in lung cancer in humans.

Exposure to high concentrations of **lead** may cause acute symptoms such as eye irritation, weakness, weight loss, abdominal pain, and anemia. Chronic exposure to lead may result in kidney disease, effects to the reproductive system, blood forming organs, and CNS damage.

Both lead and arsenic are regulated by specific OSHA standards. They are 29 CFR 1910.1025/1926.52 and 29 CFR 1910.1018/1926.1118, respectively. These standards include specific requirements for air monitoring, signs and labels, training, and medical surveillance.

Exposure to high concentrations of **selenium** can cause mucous membrane irritation, coughing, sneezing, shortness of breath, chills, headaches, hypotension, and CNS depression. Chronic exposure to selenium can cause bronchial irritation, gastrointestinal distress, excessive fatigue, and skin discoloration.

These metals are at environmental concentrations and are not expected to be at concentrations that exposure symptoms would occur. As with SVOCs, the primary route of exposure is through inhalation of dust particles when soil is disturbed and becomes airborne.

4.3.4 Asbestos-Containing Materials

The Site potentially contains asbestos-containing materials (ACM) in the forms of demolition debris within the relief holder, ACM pipe insulation, and asbestos cement pipe. Chronic exposure to asbestos may cause asbestosis and mesothelioma. The primary route of exposure for asbestos is inhalation during the disturbance and/or removal of asbestos from the pipe insulation and cement pipes.

Asbestos is strictly regulated under OSHA 29 CFR 1910.1001/1926.1101. Employees that may be potentially exposed to ACM must participate in a medical surveillance program, have specific training in the hazards and controls of exposure to asbestos, and wear respirators with high efficiency particulate (HEPA) filters. Work must be conducted in demarcated regulated areas to minimize the amount of people within the exposure area. Employers must conduct air sampling and provide signs and labels regarding the presence of asbestos.

4.3.5 Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) have previously been encountered during MGP site investigations at other sites. PCBs have historically been used from a number of sources including, but not limited to; electrical systems, hydraulic oils, lubricants, cutting oils, printer's ink, and asphalt. Exposure to PCBs can occur through unbroken skin without immediate pain or irritation. Acute effects of exposure to high concentrations of PCB can include eye, skin, nose, and throat irritation. Chronic effects of PCB exposure can include skin swelling and redness, gastro-intestinal disturbances, and neurological effects such as headache, dizziness, nervousness, and numbness of extremities. PCBs are suspected human carcinogens that can cause liver cancer. PCBs can accumulate in fatty tissues and result in health effects after the initial exposure has occurred. The primary route of exposure for

PCBs is inhalation, dermal contact, and ingestion. Analysis of soils from the Site did not indicate elevated PCB concentrations.

4.3.6 Pesticides

In general, pesticide exposures affect the CNS, liver, kidneys, and skin. At high concentrations, pesticides can cause headache, dizziness, nausea, vomiting, malaise (vague feeling of discomfort), sweating, limb jerks, convulsions, and coma.

4.3.7 Cyanide

Cyanide compounds are common by-products of manufactured gas production. Hydrogen cyanide is toxic because it is a chemical asphyxiate. It replaces the oxygen in the blood and thereby suffocates the cells. Ferro cyanides are not considered toxic because the hydrogen cyanide ion is bound too tightly to the iron and cannot therefore replace the oxygen. It takes a great amount of heat and/or acid to release cyanide gas from the ferro cyanide molecule; therefore, hydrogen cyanide is not a concern at this Site. However, it is National Grid's policy to monitor for hydrogen cyanide during earth-disturbing activities at sites where MGP-related contaminants have been found.

4.3.8 Hydrogen Sulfide

Hydrogen sulfide is another common by-product of manufactured gas production. Exposure to lower concentrations can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. These symptoms usually go away in a few weeks. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness. Breathing very high levels (> 800 parts per million [ppm]) of hydrogen sulfide can cause death within just a few breaths. The primary route of exposure is through inhalation and therefore respiratory protection is the primary control against exposure to hydrogen sulfide.

4.3.9 Evaluation of Organic Vapor Exposure

Air monitoring reduces the risk of overexposure by indicating when action levels have been exceeded and when PPE must be upgraded or changed. Action Levels for VOCs and associated contingency plans for the work zone are discussed within Section 9 of this HASP.

Exposure to organic vapors will be evaluated and/or controlled by:

- Monitoring air concentrations for organic vapors in the breathing zone with a photoionization detector (PID) or a flame ionization detector (FID).

- When possible, engineering control measures will be utilized to suppress the volatile organic vapors. Engineering methods can include utilizing a fan to promote air circulation, utilizing volatile suppressant foam, providing artificial ground cover, or covering up the impacted material with a tarp to mitigate volatile odors.
- When volatile suppression engineering controls are not effective and organic vapor meters indicate concentrations above the action levels, then appropriate respiratory protection (i.e., air purifying respirator with organic vapor cartridge) will be employed.

4.3.10 Evaluation of Skin Contact and Absorption

Skin contact by contaminants may be controlled by use of proper hygiene practices, PPE, and good housekeeping procedures. The proper PPE (e.g., Tyvek®, gloves, safety glasses) as described in Section 5 will be worn for activities where contact with potential contaminated media or materials are expected.

Safety Data Sheets (SDSs) for decontamination chemicals and laboratory reagents that may be used on Site are included in Appendix B. Specific chemical hazards information from the occupational health sources are summarized in Table 3.

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Asbestos	1332-21-4	0.1 f/cc	0.1 f/cc over 8-hr period or 1.0 f/cc over 30 min	Inhalation Ingestion Skin Contact	Asbestosis (chronic exposure), mesothelioma, breathing difficulty, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritated eyes, known human carcinogen	Respiratory system, eyes	White, greenish, blue, or gray-green fibrous solids FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 0 mm
Arsenic	7440-38-2	0.01 mg/m^3	0.01 mg/m^3 A.L. 0.005 mg/m^3	Inhalation Skin Absorption Ingestion Skin Contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen	Liver, kidneys, skin, lungs, lymphatic system	Metal: Silver-ray or tin-white, brittle, odorless solid FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 0 mm
Benzene	71-43-2	0.5 ppm (Skin)	1 ppm TWA 5 ppm STEL	Inhalation Skin Absorption Ingestion Skin Contact	Irritation of eyes, skin, nose, respiratory system, giddiness, headache, nausea; staggering gait, fatigue, anorexia, weakness, dermatitis, bone marrow depression, potential carcinogen	Eyes, skin, CNS, bone marrow, blood	FP: 12°F IP: 9.24 eV LEL: 1.2% UEL: 7.8% VP: 75 mm
Ethylbenzene	100-41-4	100 ppm	100 ppm	Inhalation Ingestion Skin Contact	Eye, skin, mucous membrane irritation; headache; dermatitis, narcosis; coma	Eyes, skin, respiratory system, CNS	FP: 55°F IP: 8.76 eV LEL: 0.8% UEL: 6.7% VP: 7 mm
Hydrogen Cyanide (HCN)	74-90-8	4.7 ppm (5 mg/m^3) STEL [skin]	10 ppm (11 mg/m^3) [skin]	Inhalation Skin Absorption Ingestion Skin and/or Eye Contact	Asphyxia; weakness, headache, confusion; nausea, vomiting; increased rate and depth of respiration or respiration slow and gasping; thyroid, blood changes	CNS, CVS, thyroid, blood	Colorless or pale blue liquid or gas (above 78oF) with a bitter almond-like odor. FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 630 mmHg

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Hydrogen Sulfide (H_2S)	7783-06-4	10 ppm TWA, 15 ppm STEL	20 ppm C, 50 ppm [10-min. Maximum peak]	Inhalation Skin and/or Eye Contact	Irritation of eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, fatigue, irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, CNS	Colorless gas with a strong odor of rotten eggs. FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 17.6 atm
Lead	7439-92-1	0.050 mg/m^3	0.05 mg/m^3 A.L. 0.03 mg/m^3	Inhalation Ingestion Skin Contact	Weakness, insomnia; facial pallor; pale eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist and ankles; irritated eyes, hypotension	Eyes, GI tract, CNS, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 0 mm
Naphthalene	91-20-3		10 ppm (50 mg/m^3) TWA	Inhalation Skin Absorption Ingestion Skin and/or Eye Contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, CNS	FP: 174°F IP: 8.12 eV LEL: 0.8% UEL: 6.7% VP: 0.08 mm
PCBs	11097-69-1	0.5 mg/m^3 [skin]	0.5 mg/m^3 [skin]	Inhalation Skin Absorption Ingestion Skin Contact	Irritant to eyes; chloracne; liver damage	Skin, eyes, liver, reproductive system	Colorless liquid or solid with a mild, hydrocarbon odor. FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 0.00006 mm

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Phenol	108-95-2	10 ppm [skin]	5 ppm (19 mg/m^3) [skin]	Inhalation Skin Absorption Ingestion Skin Contact	Irritated eyes, nose, throat, anorexia, weight loss, weakness, muscle ache, pain, dark urine, cyanosis, liver and kidney damage, skin burns, dermatitis, tremors, convulsions, twitching	Eyes, skin, respiratory system, liver, kidneys	Colorless to light pink crystalline solid with, sweet, acrid odor. FP: 175°F IP: 8.5 eV LEL: 1.8% UEL: 8.6% VP: 0.04 mm
Selenium	7782-49-2	0.2 mg/m^3	0.2 mg/m^3	Inhalation Ingestion Skin Contact	Irritant to eyes, skin, nose and throat, visual disturbance, headache, chills, fever, breathing difficulty, bronchitis, metallic taste, garlic breath, GI disturbance, dermatitis, eye and skin burns	Eyes, skin, respiratory system, liver, kidneys, blood spleen	Amphorous or crystalline, red to gray solid. FP: N/A IP: N/A LEL: N/A UEL: N/A VP: 0 mm
Toluene	108-88-3	50 ppm	200 ppm	Inhalation Skin Absorption Ingestion Skin Contact	Eye, nose irritation; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, tearing of eyes; nervousness, muscle fatigue, insomnia, tingling in limbs; dermatitis	Eyes, skin, respiratory system, CNS, liver, kidneys	FP: 40°F IP: 8.82 eV LEL: 1.1% UEL:7.1% VP: 21 mm
Xylene	1330-20-7	100 ppm	100 ppm	Inhalation Skin Absorption Ingestion Skin Contact	Eye, skin, nose, throat irritation; dizziness, excitement, drowsiness; incoordination, staggering gait; corneal damage; appetite loss, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, CNS, GI tract, blood, liver, kidneys	FP: 90°F IP: 8.56 eV LEL: 0.9% UEL: 6.7% VP: 9 mm

Abbreviations:

°F = degrees Fahrenheit
ACGIH = American Conference of Industrial Hygienists
A.L. = Action Level
atm = atmosphere
C = ceiling limit, not to be exceeded
CAS # = chemical abstract services number

LEL = Lower explosive limit
mg/m^3 = micrograms per cubic meter
min = minute
mm = millimeter
mmHg = millimeters of mercury
N/A = not applicable

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data

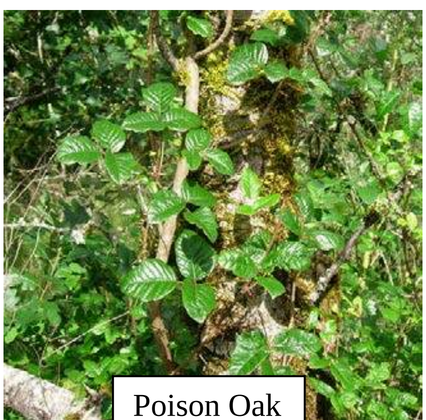
CNS = Central Nervous System
CTPV = Coal Tar Pitch Volatiles
CVS = Cardiovascular System
eV = electron volt
f/cc = fibers per cubic centimeter
FP = Flash point
GI = Gastro-intestinal
H2S = Hydrogen Sulfide
HCN = Hydrogen Cyanide
hr = hour
IP = Ionization Potential
OSHA = Occupational Safety and Health Administration
PAH = Polycyclic Aromatic Hydrocarbons
PCB = Polychlorinated Biphenyls
PEL = Permissible exposure limit
ppm = parts per million
Skin = significant route of exposure
STEL = Short-term exposure limit (15 minutes)
TWA = Time-weighted average (8 hours)
UEL = upper explosive limit
VP = vapor pressure approximately 68°F in mmHg

4.4 Biological Hazards

Areas of the Site may be wooded, surrounded with brush, or landscaped. Therefore, employees working on this project should be aware of the potential biological hazards at this Site. Each is discussed in detail below:

4.4.1 Poisonous Plants

Persons working on the Site should be aware of the possible presence of poisonous plants and insects. Poison ivy is a climbing plant with leaves that consist of three glossy, greenish leaflets. Poison ivy has conspicuous red foliage in the fall. Small yellowish-white flowers appear in May through July at the lower leaf axils of the plant. White berries appear from August through November. Poison ivy is typically found east of the Rockies. Poison oak is similar to poison ivy but its leaves are oak-like in form. Poison oak occurs mainly in the south and southwest. Poison sumac typically occurs as a small tree or shrub and may be 6 to 20 feet in height. The bark is smooth, dark and speckled with darker spots. Poison sumac is typically found in swampy areas and east of the Mississippi. The leaves have 7 to 13 smooth-edged leaflets and drooping clusters of ivory-white berries that appear in August and last through spring.


Poison Oak


Poison Ivy


Poison Sumac

The leaves, roots, stems and fruit of these poisonous plants contain urushiol. Contact with the irritating oil causes an intensely itching skin rash and characteristic, blister-like lesions.

The oil can be transmitted on soot particles when burned and may be carried on the fur of animals, equipment, and apparel.

Proper identification of these plants is the key to preventing contact and subsequent dermatitis. Wear long sleeves and pants when working in wooded areas. In areas of known infestation, wear Tyvek® coveralls and gloves. Oils are easily transferred from one surface to another. If you come in contact with these poisonous plants, wash exposed areas immediately with cool water to remove the oils. Some commercial products such as Tecnu's Poison Oak-n-Ivy Cleanser claim to further help with the removal of oils.

4.4.2 Ticks

4.4.2.1 Lyme Disease

Ticks are bloodsuckers, attaching themselves to warm-blooded vertebrates to feed. Deer ticks are associated with the transmission the bacteria that causes Lyme disease. Female deer ticks are about ¼-inch in length and are black and brick red in color. Males are smaller and all black. If a tick is not removed, or if the tick is allowed to remain for days feeding on human blood, a condition known as tick paralysis can develop. This is due to a neurotoxin, which the tick apparently injects while engorging. This neurotoxin acts upon the spinal cord causing incoordination, weakness, and paralysis.

The early stages of Lyme disease, which can develop within a week to a few weeks of the tick bite, are usually marked by one or more of these signs and symptoms:

- Tiredness
- Chills and fever
- Headache
- Muscle and/or join pain
- Swollen lymph glands
- Characteristic skin rash (i.e. bullseye rash)

4.4.2.2 Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is spread by the American dog tick, the lone-star tick, and the wood tick, all of which like to live in wooded areas and tall, grassy fields. The disease is most common in the spring and summer when these ticks are active, but it can occur anytime during the year when the weather is warm.

Initial signs and symptoms of the disease include sudden onset of fever, headache, and muscle pain, followed by development of a rash. Initial symptoms may include fever, nausea, vomiting, severe headache, muscle pain, and/or lack of appetite.

The rash first appears 2 to 5 days after the onset of fever and is often not present or may be very subtle. Most often it begins as small, flat, pink, non-itchy spots on the wrists, forearms, and ankles. These spots turn pale when pressure is applied and eventually become raised on the skin. Later signs and symptoms include rash, abdominal pain, joint pain, and/or diarrhea.

The characteristic red, spotted rash of Rocky Mountain spotted fever is usually not seen until the 6^{th} day or later after onset of symptoms, and this type of rash occurs in only 35% to 60% of patients with Rocky Mountain spotted fever. The rash involves the palms or soles in as many as 50% to 80% of patients; however, this distribution may not occur until later in the course of the disease.

4.4.2.3 Prevention

Tick season lasts from April through October; peak season is May through July. You can reduce your risk by taking these precautions:

- During outside activities, wear long sleeves and long pants tucked into socks. Wear a hat, and tie hair back.
- Use insecticides to repel or kill ticks. Repellents containing the compound n,n-diethyl-meta-toluamide (DEET) can be used on exposed skin except for the face, but they do not kill ticks and are not 100% effective in discouraging ticks from biting. Products containing permethrin kill ticks, but they cannot be used on the skin -- only on clothing. When using any of these chemicals, follow label directions carefully.
- After outdoor activities, perform a tick check. Check body areas where ticks are commonly found: behind the knees, between the fingers and toes, under the arms, in and behind the ears, and on the neck, hairline, and top of the head. Check places where clothing presses on the skin.
- Remove attached ticks promptly. Removing a tick before it has been attached for more than 24 hours greatly reduces the risk of infection. Use tweezers, and grab as closely to the skin as possible. Do not try to remove ticks by squeezing them, coating them with petroleum jelly, or burning them with a match. Keep ticks in a zip-lock baggie in case testing needs to be performed.
- Report any of the above symptoms and all tick bites to the PM and CHSO for evaluation.

4.4.3 Mosquito- Borne Disease – West Nile Virus

West Nile encephalitis is an infection of the brain caused by the West Nile virus, which is transmitted by infected mosquitoes. Following transmission from an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal CNS functioning and causes inflammation of the brain tissue. However, most infections are mild and symptoms include fever, headache, and body aches. More severe infections may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and rarely, death. Persons over the age of 50 have the highest risk of severe disease.

Prevention centers on public health action to control mosquitoes and on individual action to avoid mosquito bites. To avoid being bitten by the mosquitoes that cause the disease, use the following control measures:

If possible, stay inside between dusk and dark. This is when mosquitoes are most active. When outside (between dusk and dark), wear long pants and long-sleeved shirts. Spray exposed skin with an insect repellent, preferably containing DEET.

4.4.4 Wasps and Bees

Wasps (hornets and yellow-jackets) and bees (honeybees and bumblebees) are common insects that may pose a potential hazard to the field team if work is performed during spring, summer, or fall. Bees normally build their nests in the soil. However, they use other natural holes such as abandoned rodent nests or tree hollows. Wasps make a football-shaped, paper-like nest either below or above the ground. Yellow-jackets tend to build their nests in the ground but hornets tend to build their nests in trees and shrubbery. Bees are generally more mild-mannered than wasps and are less likely to sting. Bees can only sting once while wasps sting multiple times because their stinger is barbless. Wasps sting when they feel threatened. By remaining calm and not annoying wasps by swatting, you lessen the chance of being stung.

Wasps and bees inject a venomous fluid under the skin when they sting. The venom causes a painful swelling that may last for several days. If the stinger is still present, carefully remove it with tweezers. Some people may develop an allergic reaction (i.e. anaphylactic shock) to a wasp or bee sting. If such a reaction develops, seek medical attention at once. If a GEI employee is allergic to bees or wasps notify the SSO and if, needed, the location of the epi pen.

4.4.5 Sun Exposure

Employees are encouraged to liberally apply sunscreen, with a minimum sun protection factor (SPF) of 15, when working outdoors to avoid sunburn and potential skin cancer, which is associated with excessive sun exposure to unprotected skin. Additionally, employees should wear safety glasses that offer protection from ultraviolet A and B (UVA/UVB) rays.

5. Personal Protective Equipment

The PPE specified in Table 4 represents PPE selection required by 29 CFR 1910.132, and is based on the Activity Hazard Analysis of Section 4 (Tables 2). Specific information on the selection rationale activity can be found in the GEI Health and Safety Manual.

The PPE program addresses elements, such as PPE selection based on Site hazards, use and limitations, donning and doffing procedures, maintenance and storage, decontamination and disposal, training and proper fitting, inspection procedures prior to / during / and after use, evaluation of the effectiveness of the PPE program, and limitations during temperature extremes, heat stress, and other appropriate medical considerations. A summary of PPE for each level of protection is in Table 4.

Table 4. Site-Specific PPE

Task	PPE Level	Site-Specific Requirements	Respirator
Mobilization/Demobilization			
Reconnaissance	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D – None
Mobilization/Demobilization of Equipment and Supplies	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D – None
Establishment of Site Security, Work Zones, and Staging Area	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D – None
Construction			
Drilling, Groundwater Well Installation, Excavation, Digging Test Pits, Backfilling, Grading Observation, Sampling	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	Level D initially, Level C-If action levels exceeded (see Section 8 of HASP)
Hazardous Materials Assessment			
Sampling: Caulking, Paint, Concrete, Brick, and Soil	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	D – None
Demolition/Remediation Observation			
Observe Contractor Activities	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	D – None

Operation and Maintenance of Remediation Systems			
System component inspections, Sampling	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	Level D initially, Level C-If action levels exceeded (see Section 8 of HASP)

Use of Level A or Level B PPE is not anticipated. If conditions indicating the need for Level A or Level B PPE are encountered, personnel will leave the Site and this HASP will be revised with oversight of the CHSO or GEI personnel will not re-enter the Site until conditions allow.

For most work conducted at the site, Level D PPE will include long pants, hard hats, safety glasses with side shields, and steel toe/shank or EH-rated safety boots. When work is conducted in areas where non-aqueous phase liquid (NAPL) or tar-saturated soil is anticipated, employees will wear, at a minimum, modified Level D PPE, which can include Tyvek® coveralls and safety boots with overboots.

5.1 OSHA Requirements for PPE

Personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

Table 5. OSHA Standards for PPE

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133	ANSI Z87.1 1968
Respiratory	29 CFR 1910.134	ANSI Z88.1 1980
Head	29 CFR 1910.135	ANSI Z89.1 1969
Foot	29 CFR 1910.136	ANSI Z41.1 1999 or ASTM F-2412-2005, and ASTM F-2413-2005

CRF = Code of Federal Regulations
ANSI = American National Standards Institute
ASTM = American Society For Testing and Materials

Onsite GEI personnel who have the potential to don a respirator must have a valid fit test certification and documentation of medical clearance. The CHSO will maintain such information on file for onsite personnel. The PM will obtain such information from the subcontractor's site supervisor prior to the initiation of such work. Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.134). Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency (less than 20.7%).

- Imminent Danger to Life and Health (IDLH) concentrations.
- If contaminant levels exceed designated use concentrations.

GEI personnel accessing an energized electrical substation owned by National Grid will adhere to the following PPE requirements:

Personnel working within the National Grid substation property, or conducting intrusive work onsite, will wear flame resistant clothing as outlined in OSHA standards: “Apparel which meets the flame resistant clothing requirements of ASTM F1506-1994, is acceptable under flame and electric arc hazard conditions for compliance with the paragraph 1910.269(l)(6)(iii) standard.” This includes long pants and long-sleeved shirts to provide protection from burns in the case of coming in contact with electrical arcing. Clothing worn should have a designation citing this ASTM Standard, or be labeled as meeting “NFPA 70E,” which meets the ASTM standard. Additionally, EH-rated safety boots must be worn.

6. Key Project Personnel/Responsibilities and Lines of Authority

6.1 GEI Personnel

• Errol Kitt	GEI Project Manager
• Al Jaroszweski	GEI Site-Wide Task Manager
• Matt O'Neil	GEI Project Engineer
• Chris Berotti	GEI Site Safety Officer
• Chris Morris	Field Operations Manager
• Chris Anastasiou, Devin Byrne, Erik Curran, Mike Quinlan, John Schafer	Field Personnel
• Robin B. DeHate	GEI Corporate Health and Safety Officer
• Steve Hawkins	GEI Regional Health and Safety Officer

The implementation of health and safety at this project location will be the shared responsibility of the PM, the CHSO, the SSO, other GEI personnel implementing the proposed scope of work.

6.1.1 GEI Project Manager

The PM, Al Jaroszewski, is responsible for confirming that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include:

- Conducting and documenting the Project Safety Briefing for GEI project employees and forwarding the signed form (Appendix D) to the Health and Safety Committee;
- Verifying that the GEI staff selected to work on this program are sufficiently trained for Site activities;
- Assuring that personnel to whom this HASP applies, including subcontractor personnel, have received a copy of it;
- Providing the CHSO with updated information regarding conditions at the Site and the scope of Site work;
- Providing adequate authority and resources to the onsite SSO to allow for the successful implementation of necessary safety procedures;
- Supporting the decisions made by the SSO and CHSO;

- Maintaining regular communications with the SSO and, if necessary, the CHSO;
- Verifying that the subcontractors selected by GEI to work on this program have completed GEI environmental, health and safety requirements and has been deemed acceptable for the proposed scope of work; and
- Coordinating the activities of GEI subcontractors and confirming that they are aware of the pertinent health and safety requirements for this project.

6.1.2 GEI Corporate Health and Safety Officer

The CHSO, Robin DeHate, is the individual responsible for the review, interpretation, and modification of this HASP. Modifications to this HASP which may result in less stringent precautions cannot be undertaken by the PM or the SSO without the approval of the CHSO. Specific duties of the CHSO include:

- Writing, approving, and amending the HASP for this project;
- Advising the PM and SSO on matters relating to health and safety on this Site;
- Recommending appropriate PPE and safety equipment to protect personnel from potential Site hazards;
- Conducting accident investigations; and
- Maintaining regular contact with the PM and SSO to evaluate Site conditions and new information which might require modifications to the HASP.

6.1.3 GEI Site Safety Officer

GEI field staff are responsible for implementing the safety requirements specified in this HASP. However, one person will serve as the SSO. For this program, Chris Berotti will serve as the SSO. The SSO will be onsite during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Conducting/attending the Project Safety Briefing prior to beginning work, and subsequent safety meetings as necessary;
- Conduct daily Safety Tailgate meeting in accordance with National Grid's requirements (can be combined with "pre-entry") briefing for Site-related work;

- Verifying that personnel to whom this HASP applies have attended and participated in the Project Safety Briefing and subsequent safety meetings that are conducted during the implementation of the program;
- Maintaining a high level of health and safety consciousness among employees implementing the proposed activities;
- Procuring the air monitoring instrumentation required and performing air monitoring for investigative activities;
- Procuring and distributing the PPE and safety equipment needed for this project for GEI employees;
- Verifying that PPE and health and safety equipment used by GEI is in good working order;
- Verifying that the selected contractors are prepared with the correct PPE and safety equipment and supplies;
- Notifying the PM of noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of personnel within the established restricted areas to confirm that required safety and health procedures are being followed;
- Stopping work in the event that an immediate danger situation is perceived; and
- Reporting accident/incident and preparing accident/incident reports, if necessary.

6.1.4 GEI Field Personnel

GEI field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading and signing the HASP in its entirety prior to the start of onsite work;
- Attending and actively participating in the required Project Safety Briefing prior to beginning onsite work and any subsequent safety meetings that are conducted during the implementation of the program;
- Stopping work in the event that an immediate danger situation is perceived;
- Bringing forth any questions or concerns regarding the content of the HASP to the PM or the SSO, prior to the start of work;

- Reporting accidents, injuries, and illnesses, regardless of their severity, to the SSO, CHSO, and HR; and
- Complying with the requirements of this HASP and the requests of the SSO.

6.1.5 Lines of Authority will be as follows:

On Site – GEI will have responsibility for safety of its employees during the work performed at the Bay Shore/Brightwaters Former MGP Site. GEI's field representative will have a cell phone available to contact the appropriate local authorities, in the event of an emergency. GEI's field representative will be available for communication with the GEI PM and with National Grid's representative.

GEI employees have the authority to stop work activities if an unanticipated hazard is encountered or a potential unsafe condition is observed. The GEI employee should contact the Corporate Health and Safety Officer and the Project Manager to discuss the stop work conditions and potential control methods that can be implemented.

6.2 Subcontractors

At this time subcontractors have not been hired to assist in performing work on this project, however, GEI requires its subcontractors to work in a responsible and safe manner. Subcontractors for this project will be required to develop their own HASP for protection of their employees, but, at a minimum, must adhere to applicable requirements set forth in this HASP.

7. Training Program

7.1 HAZWOPER Training

In accordance with OSHA Standard 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" (HAZWOPER) responders will, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. At a minimum, the training will have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training will not be allowed to work in any Site activities in which they may be exposed to hazards (chemical or physical). Proof of training will be submitted to the PM or his/her representative prior to the start of field activities.

7.2 Annual 8-Hour Refresher Training

Annual 8-hour refresher training will be required of hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 29 CFR 1910.120 requirements and related company programs and procedures. Proof of current 8-hour refresher training will be submitted to the PM or his/her representative prior to the start of field activities.

7.3 Supervisor Training

Personnel acting in a supervisory capacity will have received 8 hours of instruction in addition to the initial 40-hour training. In addition, supervisors will have 1 year of field experience and training specific to work activities (i.e., sampling, construction observation, etc.)

7.4 Site-Specific Training

Prior to commencement of field activities, the PM or the SSO will verify GEI field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the Site operations. It will include Site and facility layout, hazards, and emergency services at the Site, and will highlight the provisions contained within this HASP and applicable GEI H&S SOPs (Appendix E). This training will be documented on the Project Safety Briefing Form (Appendix D). The signed form will be forwarded to the Health and Safety Committee at: healthandsafety@geiconsultants.com. In addition, GEI personnel will sign the plan to document that they understand the hazards and control measures presented and agree to comply with the procedures established in the HASP. Personnel that have not received project-specific training will not be allowed onsite.

7.5 On-Site Safety Briefings

Other GEI personnel will be given health and safety briefings daily by the SSO or field representative to assist GEI personnel in safely conducting work activities. The briefing will include GEI subcontractors. The briefings can include information on new operations to be conducted, changes in work practices, or changes in the Site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. Documentation of these briefings will be recorded in the GEI field book, if the project duration is less than 5 days. If the project is longer than 5 days, the Tailgate Safety Briefing Form (Appendix D) will be used to document briefings. The meetings will also be an opportunity to periodically update the employees on monitoring results.

7.6 First Aid and CPR

The PM will verify that GEI field staff has current certifications in first aid and Cardiopulmonary Resuscitation (CPR), so that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association. GEI employees also attend annual Bloodborne Pathogens training in compliance with OSHA regulations.

7.7 Railroad Worker Safety Training

Working on both former and active railroad property may require additional training due to the unique hazards associated with railroads. Safety and education is a primary focus for railroads which are dedicated to keeping people safe around trains by reducing the likelihood of train/vehicle and pedestrian collisions. Prior to a GEI employee performing field work on railroad sites, or work that is performed adjacent to a railroad line, the employee should confirm with the PM that the required specific railroad safety training has been completed. Each railroad may have specific requirements to accomplish this certification. For example, Norfolk Southern Corporation requires a background check, On-Track Training and company-specific E-Railsafe Training. This training can be accomplished on-line, but some site specific training may also be included based on the railroad’s standard operating procedures. Once certification has been completed, the credentials must be with the employee while working on railroad property. The PM will verify that GEI staff requiring this training has been issued a completion card.

For the Bay Shore Site all GEI employees and any subcontractors working on Long Island Rail Road (LIRR) property must have the LIRR Roadway Worker Protection (RWP) training and must carry their RWP “blue card” on their person while on LIRR property. This training can be arranged by emailing Gregory James (gjames@lirr.org).

8. Medical Surveillance Program

GEI maintains a continuous, corporate, medical surveillance program that includes a plan designed specifically for field personnel engaged in work at sites where hazardous or toxic materials may be present. Robin DeHate is GEI's CHSO and is responsible for the administration and coordination of medical evaluations conducted for GEI's employees at branch office locations. Comprehensive examinations are given to GEI field personnel on an annual or biennial basis (as determined to be appropriate by the CHSO) participating in hazardous waste operations. The medical results of the examinations aid in determining the overall fitness of employees participating in field activities.

Under the CHSO's supervision, field personnel undergo a complete initial physical examination, including a detailed medical and occupational history, before they participate in hazardous waste site investigations. Extensive annual/biennial reexaminations are also performed. Upon completion of these tests, personnel are certified by an occupational health physician as to whether they are fit for field work in general, and fit to use respiratory protection.

If a GEI employee or other project worker shows symptoms of exposure to a hazardous substance and wishes to be rechecked, he/she will be directed to the nearest area hospital or medical facility.

GEI subcontractor personnel that will enter any active waste handling or other active non-"clean" area must certify that they are participating in a medical surveillance program that complies with OSHA regulations for hazardous waste operations (i.e., 29 CFR 1910.120 and 29 CFR 1926.65). Proof of medical clearance will be submitted to the GEI PM or SSO prior to the start of field activities.

9. Monitoring

Air monitoring will be performed to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of worker protection needed on-site in the event that intrusive work is conducted. Work requiring air monitoring includes the installation and/or abandonment of monitoring wells, DNAPL recovery wells, oxygen injection wells, and soil vapor points. Additionally, PID screening of the well head space will be conducted during groundwater sampling activities.

GEI may conduct perimeter air monitoring, and work zone monitoring for onsite GEI employees during intrusive activities only. Activities requiring air monitoring will be conducted in accordance with a pre-approved work plan. GEI will monitor and document daily Site conditions and operations and inform field representatives of results. If Action Levels are exceeded, the SSO will immediately implement Site action(s) according to Table 6 below and notify the PM and CHSO.

GEI will provide the following equipment for health and safety monitoring of onsite GEI personnel:

- PID with 10.6 eV lamp or equivalent;
- Drager Chip Measurement System (CMS) with appropriate gas detection chips;
- Sensidyne Gas Detection Pump with appropriate gas detector tubes;
- Particulate Meter (PM-10 capable)
- Dust Meter;
- Combustible Gas Indicator (CGI): LEL / Oxygen (O_2) / hydrogen sulfide (H_2S) / hydrogen cyanide (HCN) meter.

Air monitoring equipment will be calibrated and maintained in accordance with the manufacturer's requirements. Calibrations will be recorded in the project notes daily or on a daily calibration form.

Organic vapor concentrations will be measured using a PID during intrusive activities. During intrusive operations, organic vapor concentrations will be measured continuously. Organic vapor concentrations will be measured upwind of the work site(s) to determine background concentrations at least twice a day, (once in the morning and once in the afternoon). The SSO will interpret monitoring results using professional judgment and according to the alert and Action Limits set forth in the associated Site Work Plan.

A dust meter will be used to measure airborne particulate matter during intrusive activities. Monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the Action Levels. Monitoring personnel will make a best effort to collect dust monitoring data from downwind of the intrusive activity. If offsite sources are considered to be the source of the measured dust, upwind readings will also be collected.

A CGI meter will be used to monitor for combustible gases and O_2 content in the work zone during intrusive activities. The CGI will also be equipped with an H_2S sensor and an HCN sensor. H_2S monitoring will be completed every 15 minutes or, if a sulfur odor is present, monitoring will be continuous. HCN monitoring will be completed every 15 minutes or, if an almond odor is detected, monitoring will be continuous.

The perimeter and work zone air monitoring will be conducted during intrusive activities. Table 6 provides a summary of real time air monitoring Action Levels and contingency plans for work zone activities. The below Action Levels are determined by halving the Permissible Exposure Limits (PELs) or Threshold Limit Values (TLVs) as set forth by OSHA and the American Conference of Government Industrial Hygienists (ACGIH). O_2 values are based on the maximum use limits of a full face respirator if oxygen were being displaced by a chemical.

Table 6. Real-Time Work Zone Air Monitoring Action Levels

Air Monitoring Instrument	Monitoring Location	Action Level (above background)	Site Action
PID	Work Zone	1.0 ppm	Use detector tube for benzene or zNose® to verify if concentration is benzene. No respiratory protection is required if benzene is not present.
PID	Work Zone	10 ppm	Use Sensidyne detector tube for naphthalene or zNose® to verify if concentration is naphthalene. No respiratory protection is required if naphthalene is not present.
		10 – 50 ppm	No respiratory protection is required if benzene or naphthalene is not present.
		50 – 100 ppm	Stop work, withdrawal from work area, institute engineering controls, if levels persist, upgrade to Level C.
		> 100 ppm	Stop work, withdraw from work area, notify PM and CHSO.
O_2 Meter	Work Zone	< 20.7%	Stop work, withdraw from work area, ventilate area, notify PM and CHSO.
		> 21.1%	Stop work, withdraw from work area, notify PM and CHSO.
H_2S Meter	Work Zone	< 5.0 ppm	No respiratory protection is required.
		> 5.0 ppm	Stop work, cover excavation, withdraw from work area, institute engineering controls, notify PM and CHSO.
HCN Meter	Word Zone	< 1.0 ppm	Run CMS Drager tube. Continue monitoring with real-time meter, and continue work if CMS Drager tube reading is less than 2.0 ppm.
		> 1.0 ppm HCN Concentrations < 2.0 ppm	Run CMS Drager tube and confirm concentration is less than 2.0 ppm, notify PM and CHSO. Run CMS tube for sulfur dioxide, hydrogen sulfide, and phosphine chip potential interferences. Continue to monitor with real-time meter.
		> 2.0 ppm	Stop work, and move (with continuous HCN monitoring meter) at lease 25 ppm upwind of the excavation until continuous meter reads less than 1 ppm, notify PM and CHSO. Run CMS Drager hydrogen cyanide chip and re-evaluate activity, continue monitoring with a real-time meter, resume work if concentrations read less than 1.0 ppm.
CGI	Work Zone	< 10% LEL	Investigate possible causes, allow excavation to ventilate, use caution during procedures.
		> 10% LEL	Stop work, allow excavation/borehole to ventilate to < 10% LEL, if ventilation does not result in a decrease to < 10% LEL, withdraw from work area, notify PM and CHSO.
Particulate Meter	Work Zone	150 micrograms per cubic meter ($\mu g/m^3$)	Implement work practices to reduce/minimize airborne dust generation, e.g., spray/misting of soil with water.

10. Site Control Measures

10.1 Site Zones

Site zones are intended to control the potential spread of contamination and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It will include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones will be established on the work site by the Contractor when operations begin for each task requiring such delineation. Maps depicting the zones will be available at the Site.

This project is being conducted under the requirements of 29 CFR 1910.120, and any personnel working in an area where the potential for exposure to Site contaminants exists, will only be allowed access after proper training and medical documentation.

The following will be used for guidance in revising these preliminary zone designations, if necessary.

***Support Zone* –** The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for medical emergency. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone.

***Contamination Reduction Zone* –** The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

***Exclusion Zone* –** Activities which may involve exposure to Site contaminants, hazardous materials, and/or conditions should be considered an EZ. This zone will be clearly delineated by cones, tapes, or other means. The Contractor may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ will be determined by the Contractor allowing adequate space for the activity to be completed, field members, and emergency equipment.

The Contractor is responsible for constructing, maintaining, and enforcing the zones.

10.2 Buddy System

GEI personnel should be in line-of-site or communication contact with another onsite person. The other onsite person should be aware of his or her role as a "buddy" and be able to provide assistance in the event of an emergency. A copy of this plan will be given to any person acting as a GEI "buddy" for informational purposes.

10.3 Sanitation for Temporary Work Sites

Temporary sanitary facilities including toilets will be available onsite.

10.4 Illumination

Illumination requirements identified by OSHA are directed to work efforts inside buildings and/or during non-daylight hours. Activities planned for the Site are anticipated to occur outside during daylight hours. However, if yard areas are used after dark, they will be equipped with illumination that meets or exceeds requirements specified in OSHA Standard 29 CFR 1926.56 "Illumination."

11. Accident Reporting

GEI will report incidents involving GEI personnel or subcontractor personnel, such as lost time injuries, injuries requiring medical attention, near miss incidents, fires, fatalities, accidents involving the public, and property damage. The report will be made to the GEI PM verbally as soon as possible, but no later than 2 hours of the incident. The PM will immediately inform the CHSO, the Director of Human Resources and a Project-Specific National Grid Representative of any accident, incident, injury or near miss. A GEI Accident Report form will be submitted within 12 hours of the incident. A DRAFT National Grid Incident Report Form will be completed by the CHSO and submitted to the Project-Specific National Grid Representative within 24 hours.

Staff must be aware that addressing accidents and injuries takes precedence over completing field work. If a staff member requires medical attention, or an incident/accident has occurred that call this into question, work must stop and the situation must be addressed.

12. Decontamination Procedures

A decontamination pad has been established for personnel decontamination and equipment decontamination.

12.1 Personnel Decontamination Station

A personnel decontamination station where employees can drop equipment and remove PPE will be set up at the decontamination pad by the Contractor. It will be equipped with basins for water and detergent, and trash bag(s), or cans for containing disposable PPE and discarded materials. Once personnel have decontaminated at this station and taken off their PPE, they will proceed to a sink where they will wash themselves wherever they have potentially been exposed to any contaminants (e.g., hands, face, etc.)

The following specific decontamination procedure will be used as necessary by GEI personnel or subcontractor personnel wearing PPE from Level D through Level C.

- ***Step 1 –*** Equipment drop (respirator, tools, monitoring equipment, etc.) Decontaminate as appropriate (per GEI's field representative's instructions).
- ***Step 2 –*** Boot wash/rinse (wash with non-foaming detergent, rinse with fresh water spray). Remove boots. If inner and outer gloves are worn, wash outer gloves, remove and save for later use, or remove and discard outer gloves and place in trash bag/can provided in the decontamination area.
- ***Step 3 –*** Hard hat removal; wash if visibly contaminated (use same wash as in Step 2).
- ***Step 4 –*** If Tyvek® (or equivalent) suit was worn and is visibly contaminated, remove and place in trash bag/can provided in the decontamination area or decontaminate (wash) and store for reuse. Contaminated washable coveralls should be removed and bagged for washing.
- ***Step 5 –*** Respirator and/or eye protection removal (as applicable). Wash (per Step 2) to remove visible contamination.
- ***Step 6 –*** Remove outer gloves.
- ***Step 7 –*** Wash potentially exposed skin (use water and soap at indoor sink).
- ***Step 8 –*** Disinfect respirator per manufacturer's recommendations.

Contaminated PPE (gloves, suits, etc.) will be decontaminated and stored for reuse or placed in plastic bags (or other appropriate containers) and disposed of in an approved facility.

Decontamination wastewater and used cleaning fluids will be collected and disposed of in accordance with applicable state and federal regulations.

12.2 Heavy Equipment Decontamination

Heavy equipment decontamination will be performed by the Contractor within the limits of the on-site decontamination pad in accordance with the contract specifications. A steam generator and brushes will be used to clean demolition equipment and other tools. No heavy equipment will be permitted to leave the Site unless it has been thoroughly decontaminated.

Wastewater from the heavy equipment and personnel decontamination areas will be collected and disposed of in accordance with applicable state and federal regulations. The Contractor will be responsible for ultimate disposal of investigation-derived wastes.

12.3 Decontamination Equipment Requirements

The following equipment, if required, should be in sufficient supply to implement decontamination procedures for GEI’s equipment.

- Buckets
- Alconox™ detergent concentrate
- Hand pump sprayers
- Long handled soft bristle brushes
- Large sponges
- Cleaning wipes for respirators
- Bench or stool(s)
- Methanol and/or Nitric Acid
- Liquid detergent and paper towels
- Plastic trash bags

The Contractor performing decontamination procedures is responsible for verifying that the above materials, as required for their operation, are in sufficient supply.

13. Supplemental Contingency Plan Procedures

13.1 Hazard Communication Plan

GEI personnel have received hazard communication training as part of their annual health and safety training and new employee health and safety orientation training. Hazardous materials used on the Site will be properly labeled, stored, and handled. SDS will be available to potentially exposed employees.

13.2 Fire

In the event of a fire personnel will evacuate the area. GEI's field representative will contact the local fire department with jurisdiction and report the fire. Notification of evacuation will be made to the PM and the CHSO. The field representative will account for GEI personnel and subcontractor personnel and report their status to the PM.

13.3 Medical Support

In case of minor injuries, onsite care will be administered with the Site first aid kit. For serious injuries, call 911 and request emergency medical assistance. Seriously injured persons should not be moved, unless they are in immediate danger. Notify the PM and the CHSO of the emergency.

Section 1 and Table 1 of this HASP contain detailed emergency information, including directions to the nearest hospital, and a list of emergency services and their telephone numbers. In addition, Appendix A includes maps to the hospital and/or occupational health clinic. GEI field personnel will carry a cellular telephone.

13.4 Severe Weather

The contingency plan for severe weather includes reviewing the expected weather to determine if severe weather is in the forecast. Severe weather includes high winds over 30 miles per hour (mph), heavy rains or snow squalls, thunderstorms, tornados, and lightning storms. If severe weather is approaching, the decision to evacuate GEI personnel and subcontractor personnel from the Site will be the responsibility of GEI's field representative. Notification of evacuation will be made to the PM and the CHSO. The field representative will account for GEI personnel and subcontractor personnel and report their status to the PM. If safe, work can resume 30 minutes after the last clap of thunder or flash of lightening.

13.5 Spills or Material Release

If a hazardous waste spill or material release occurs, if safe, the SSO or their representative will immediately assess the magnitude and potential seriousness of the spill or release based on the following:

- SDS for the material spilled or released;
- Source of the release or spillage of hazardous material;
- An estimate of the quantity released and the rate at which it is being released;
- The direction in which the spill or air release is moving;
- Personnel who may be or may have been in contact with the material, or air release, and possible injury or sickness as a result;
- Potential for fire and/or explosion resulting from the situation; and
- Estimates of area under influence of release.

If the spill or release is determined to be within the onsite emergency response capabilities, the SSO will verify implementation of the necessary remedial action. If the release is beyond the capabilities of the Site personnel, personnel will be evacuated from the immediate area and the local fire department will be contacted. The SSO will notify the PM and the CHSO.

13.6 Alcohol and Drug Abuse Prevention

Alcohol and drugs will not be allowed on the work Site. Project personnel under the influence of alcohol or drugs will not be allowed to enter the Site.

14. Health and Safety Plan Sign-Off

GEI personnel conducting site activities will be familiar with the information in this HASP. After reviewing this plan, please sign the copy in the project files, and bring a copy of the plan with you to the Site.

Site Name: Bay Shore/Brightwaters Former MGP Site

Investigation: Former MGP Site remediation and monitoring

GEI Project No: 093180

Print Name	Signature
Site-Wide Task Manager: Al Jaroszewski	

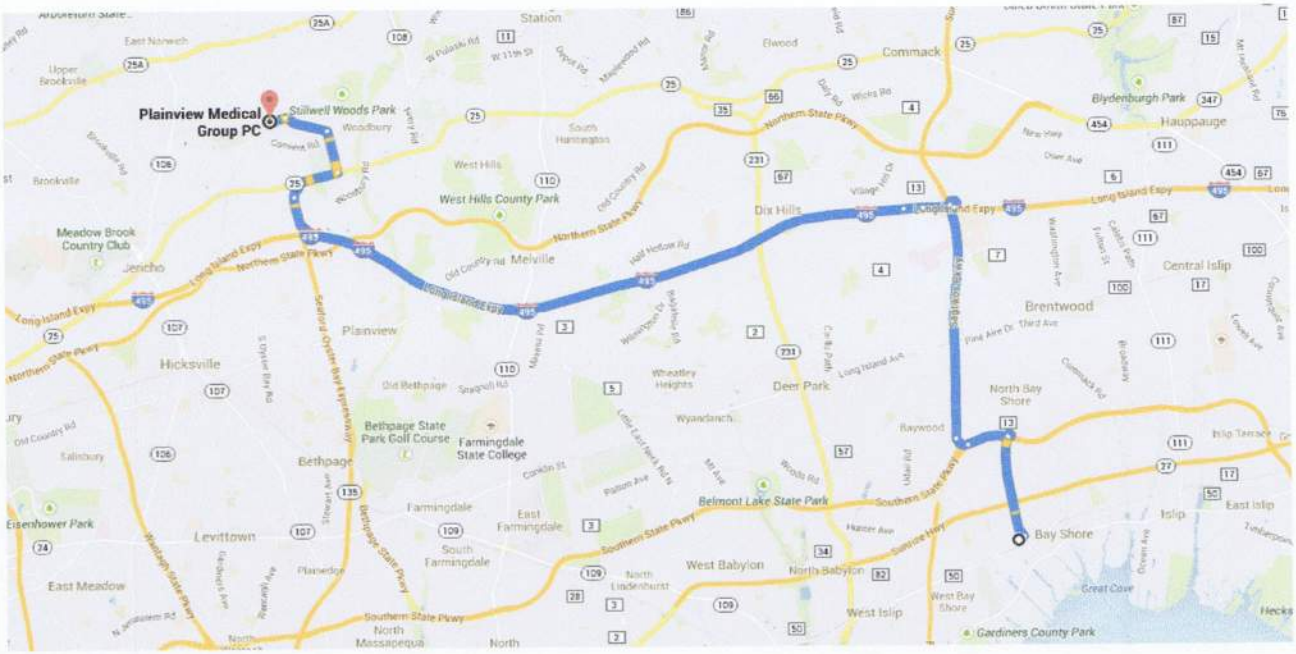
Appendix A

Map to Hospital and Occupational Health Clinic

Google

Drive 22.0 miles, 27 min

Directions from **1 Orinoco Dr, Brightwaters, NY 11718** to **Plainview Medical Group PC**



○ 1 Orinoco Dr, Brightwaters, NY 11718

Get on **Southern State Pkwy** in Bay Shore

2.0 mi / 5 min

1. Head **northeast** on **Ackerson St** toward **Clinton Ave**

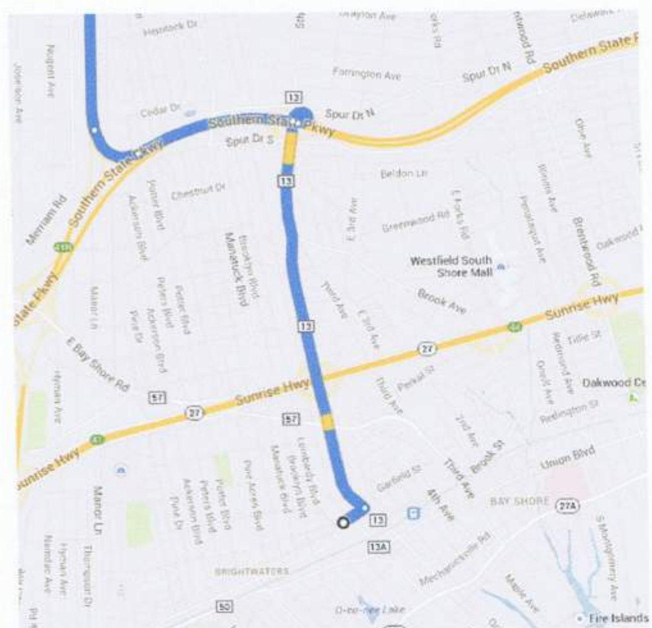
   0.1 mi

2. Turn **left** onto **5th Ave**

   1.8 mi

3. Take the ramp onto **Southern State Pkwy**

   0.2 mi



Take **Sagtikos Pkwy** and **I-495 W** to **New York 25 E/Jericho Turnpike** in Woodbury. Take exit **14E** from **NY-135 N**

17.6 mi / 18 min

4. Merge onto **Southern State Pkwy**

0.7 mi

5. Take exit **41A** for **Sagtikos Parkway** toward **Sunken Meadow Park**

0.2 mi

6. Merge onto **Sagtikos Pkwy**

4.0 mi

7. Take exit **S1W** toward **I-495 W/New York**

0.3 mi

8. Merge onto **Long Island Expressway North Service Rd**

0.5 mi

9. Take the **Interstate 495 W** ramp on the **left** to **New York**

0.3 mi

10. Merge onto **I-495 W**

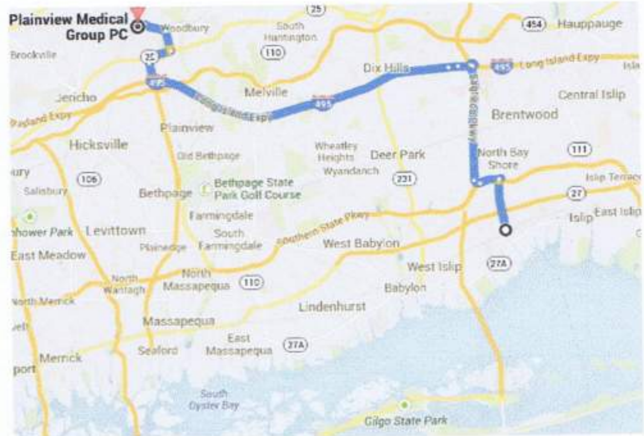
10.4 mi

11. Take exit **44** to merge onto **NY-135 N** toward **Syosset**

0.8 mi

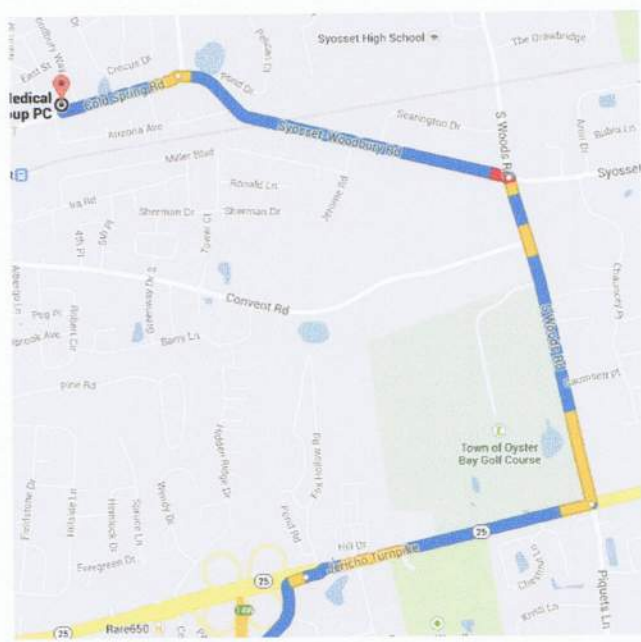
12. Take exit **14E** for **New York 25 E** toward **Woodbury**

0.3 mi



Continue on **New York 25 E/Jericho Turnpike**. Take **S Woods Rd** and **Syosset-Woodbury Rd** to **Cold Spring Rd** in Syosset

2.4 mi / 5 min



13. Turn **right** onto **New York 25 E/Jericho Turnpike**

0.6 mi

14. Turn **left** onto **S Woods Rd**

0.7 mi

15. Turn **left** onto **Syosset-Woodbury Rd**

0.8 mi

16. Turn **left** onto **Cold Spring Rd**

Destination will be on the right

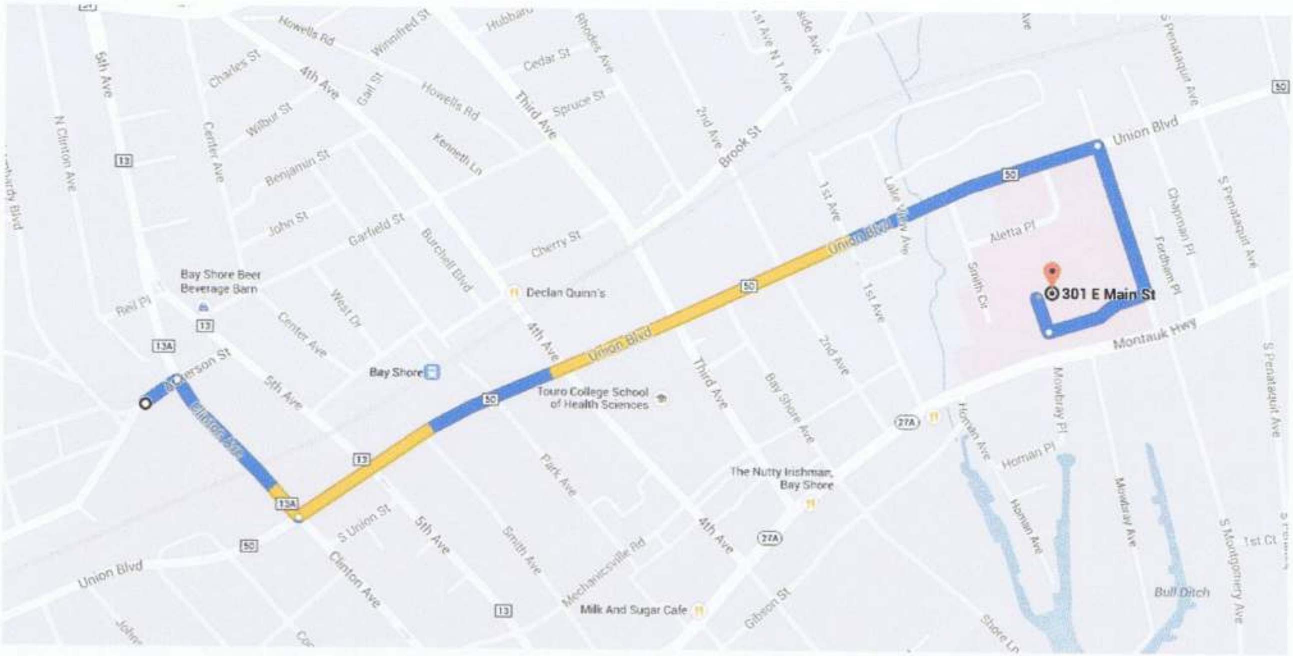
0.3 mi

Plainview Medical Group PC

87 Cold Spring Rd, Syosset, NY 11791

Google SOUTHSIDE HOSPITAL Drive 1.5 miles, 4 min

Directions from **1 Orinoco Dr, Brightwaters, NY 11718** to **301 E Main St** Bay Shore, NY



1 Orinoco Dr, Brightwaters, NY 11718

1. Head **northeast** on **Ackerson St** toward **Clinton Ave**

   226 ft

2. Turn **right** onto **Clinton Ave**

   0.2 mi

3. Take the 1st **left** onto **Union Blvd**

   0.9 mi

4. Turn **right** onto **Montgomery Ave**

   0.2 mi

5. Turn **right**

   0.1 mi

6. Turn **right**

   Destination will be on the right

   200 ft

301 E Main St

Bay Shore, NY 11706

Appendix B

Safety Data Sheets

Appendix

Material Data Sheets

VOLATILE ORGANIC COMPOUNDS (VOCs)

Minnesota Department of Health Fact Sheet

September 2005

Volatile Organic Compounds - VOCs

What are VOCs?

Volatile Organic Compounds (VOCs) are chemicals that evaporate easily at room temperature. The term "organic" indicates that the compounds contain carbon. VOC exposures are often associated with an odor while other times there is no odor. Both can be harmful. There are thousands of different VOCs produced and used in our daily lives. Some examples are:

- Benzene
- Toluene
- Methylene
- Chloride
- Formaldehyde
- Xylene
- Ethylene glycol
- Texanol
- 1,3-butadiene

Where do VOCs come from?

Many products emit or "off-gas" VOCs. Some examples of VOC emission sources are:

- Paints
- Varnishes
- Moth balls
- Solvents
- Gasoline
- Newspaper
- Cooking
- Cleaning Chemicals
- Vinyl floors
- Carpets
- Photocopying
- Upholstery Fabrics
- Adhesives
- Sealing Caulks
- Cosmetics
- Air Fresheners
- Fuel Oil
- Vehicle Exhaust
- Pressed wood furniture
- Environmental Tobacco Smoke (Secondhand smoke)

What levels of VOC are typical in the home?

As of July, 2003 neither Minnesota nor the federal government have set standards for VOC levels in non-occupational settings. However, some guidelines are available. MDH has established Health Risk Values (HRVs) for some contaminants in air for several different exposure situations. For more information on these HRVs go to MDH Health Risk Values Website.

Many studies have shown VOC levels are higher in indoor air than outdoor air. The U.S. Environmental Protection Agency (EPA) Total Exposure Assessment Methodology (TEAM) studies have found indoor VOC levels that were 2 to 5 times higher than outdoors.

Levels of VOC exposure in indoor air vary widely depending on:

- the volume of air in the room/building
- the rate at which the VOC is off-gassed
- the building ventilation rate
- outdoor concentrations

Along with the concentration of VOCs in a given environment, the time an individual spends in that environment is important in determining exposure.

What are the health effects of VOC exposure?

Acute

- Eye irritation / watering
- Nose irritation
- Throat irritation
- Headaches
- Nausea / Vomitting
- Dizziness
- Asthma exacerbation

Chronic

- Cancer
- Liver damage
- Kidney damage
- Central Nervous System damage.

MINNESOTA MDH DEPARTMENT of HEALTH

Indoor Air Unit
P.O. Box 64975
St, Paul, MN, 55164-0975
651-201-4601 or 800-798-9050
www.health.state.mn.us/divs/eh/air

Volatile Organic Compounds - VOCs – page 2

Most studies to date have been conducted on single chemicals. Less is know about the health effects of combined chemical exposure. The best health protection measure is to limit your exposure to products and materials that contain VOCs when possible. If you think you may be having health problems caused by VOC exposure consult an occupational/environmental health physician who specializes in this area

Are some people at greater risk from VOC exposure than others?

Persons with respiratory problems such as asthma, young children, elderly, and persons with heightened sensitivity to chemicals may be more susceptible to illness from VOC exposure.

How can I tell what levels of VOC are in my home?

Some home screening kits are available to measure total volatile organic compound (TVOC) levels, and some individual VOCs. These home sampling kits should be viewed as providing "ballpark" amount of VOCs in the indoor air. Conditions such as ventilation, temperature and humidity can cause VOC concentrations to fluctuate daily

Prior to testing conduct an inspection of your home for some common sources of VOCs such as:

- New carpeting
- New furniture
- Idling automobile in attached garage
- Recent painting
- Chemicals stored in the home
- Recently applied adhesives
- New plastic or electronic devices

Once you determine the probable source of VOCs, steps can be taken to reduce your exposure. If you are unable to determine the source, a professional indoor air quality investigator / industrial hygienist can be consulted. MDH has a service provider list along with recommendations on selection. MDH also has a guidance document that can be used for investigating possible VOC contamination entitled "Indoor Air Sampling at VOC contaminated sites"

How do I reduce the levels of VOCs in my home?

Most products containing VOCs will off-gas within a short period of time although some will continue to give off trace amounts of VOCs for a long period of time. The best means of reducing VOC exposure is to eliminate products containing VOCs or use low emitting VOC products.

Some steps you can take to reduce your exposure to VOC in the home are:

- Source control
  - eliminate products from home that have high levels of VOCs
  - purchase new products that contain low or no VOCs (environmentally preferable purchasing)
- Ventilation – open doors and windows, use fans.
- Control climate – as temperature and humidity increase some chemicals will off gas more.
- Treat the source – airtight sealers can be used to coat over some products. However, caution is advised in choosing the coating product as this could introduce new VOCs into the air while controlling for others.
- Air cleaners – look for ones with activated charcoal filtration designed to remove chemicals from the air.
- Remove unused chemicals from the home. Check with city or county for household hazardous waste collection sites.
- Perform renovations when home is unoccupied.

For more information on VOCs or other Indoor Air Quality Issues Contact:

The Minnesota Department of Health
Indoor Air Unit
625 Robert Street North, PO Box 64975
St. Paul, MN 55164-0975
651/201-4601 or 800/798-9050

View the Air Quality web page at:
www.health.state.mn.us/divs/eh/air

To require this document in another form contact:
Call 651/201-4601. TTY: 651/201-5797 or Minnesota Relay Service TTY: 1- 800/627-3529.

IC#141-1381
Revised 9/05
Printed on recycled paper.

SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)

Mid-Atlantic Cleanup
Brownfields Home
News and Events
Pilots/Grants
Grants Information
Successes
Technical Support
State Brownfields Programs
Federal Partnership Resource Guide
Related Laws and Regulations
Contacts

Semi-Volitile Organic Compounds

This Fact Sheet is presented by the U. S. Environmental Protection Agency, Region III (EPA) to assist in the selection of analytical parameters and the associated Quality Assurance and Quality Control (QA/QC) procedures to be utilized in Phase II Environmental Assessments under the U.S. Environmental Protection Agency (EPA) Brownfields initiative. This fact sheet is presented for informational purposes only, and should not be construed as a federal policy or directive. The Brownfields Coordinator for this region may be reached at 215-814-5000.

A semivolatile organic compound is an organic compound which has a boiling point higher than water and which may vaporize when exposed to temperatures above room temperature. Semivolatile organic compounds include phenols and polynuclear aromatic hydrocarbons (PAH).

LIST OF SEMIVOLATILE ORGANIC COMPOUNDS *

- Phenol
- Bis(2-chloroethyl)ether
- 2-Chlorophenol
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- 1,2-Dichlorobenzene
- 2-Methylphenol
- Bis(2-chloroisopropyl)ether
- 4-Methylphenol
- n-Nitroso-di-n-propylamine
- Hexachloroethane
- Nitrobenzene
- Isophorone
- 2-Nitrophenol
- 2,4-Dimethlyphenol
- Bis(2-chloroethoxy)methane
- 2,4-Dichlorophenol
- 1,2,4-Trichlorobenzene
- Naphthalene
- 4-Chloroaniline
- Hexachlorobutadiene
- 4-Chloro-3-methylphenol
- 2-Methlynaphthalene
- Hexachlorocyclopentadiene
- 2,4,6-Trichlorophenol
- 2,4,5-Trichlorophenol
- 2-Chloronaphthalene
- 2-Nitroaniline
- Dimethylphthalate
- Acenaphthylene
- 2,6-Dinitrotoluene

- 3-Nitroaniline
- Acenaphthene
- 2,4-Dinitrophenol
- 4-Nitrophenol
- 4-Bromophenyl-phenylether
- Hexachlorobenzene
- Pentachlorophenol
- Phenanthrene
- Anthracene
- Carbazole
- Di-n-butylphthalate
- Fluoranthene
- Pyrene
- Butylbenzylphthalate
- 3,3'-Dichlorobenzidine
- Benzo(a)anthracene
- Chrysene
- Bis(2-ethylhexyl)phthalate
- Di-n-octylphthalate
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(a)pyrene
- Indeno(1,2,3-cd)pyrene
- Dibenz(a,h)anthracene
- Benzo(g,h,i)perylene

* Please note: The list above corresponds to the EPA Contract Laboratory Program (CLP) semivolatile organic list, and is not a complete list of all toxic semivolatile organic compounds. If the site history suggests a semivolatile organic compound may be present which is not on this list, the compound should be included in the requested analysis.

ANALYSIS METHODS

Please note that the methods listed below are EPA approved and the most commonly used by EPA and their contractors. However, they are not the only methods for the analysis of semivolatile organic compounds. In addition, these are not drinking water test methods.

METHOD	APPLICABLE MATRICES
EPA 625 or 1625 (1)	Aqueous
EPA SW-846 3010 or 3020/8250 or 8270 (2)	Aqueous
EPA SW-846 3500 or 3550/8250 or 8270 (2)	Soil/Sediment & Waste
EPA CLP Statement of Work 3/90	Aqueous & Soil/Sediment
EPA SW-846 8100 or 8310 (2) 610 (1)	Water and Soil/Sediment for PAH
EPA SW-846 8040 (2) or 604 (1)	Water and Soil/Sediment for Phenols

1. U.S. Environmental Protection Agency (EPA). 1992. *Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater.* Washington, D.C. July.
2. EPA. 1986. *Test Methods for Evaluating Solid Waste*. SW-846. Washington, D.C. September.

COLLECTION MEDIA/VOLUME

Listed below are the EPA-recommended preservation and holding times as well as suggested glassware.

MATRIX	GLASSWARE	VOLUME	PRESERVATIVE	HOLDING TIME
Soil/Sediment	8-oz wide mouthed jar	1 8-oz jar	ice to 4° C	14 days
Aqueous	32-oz amber bottle	2 amber bottles	ice to 4° C	7 days
Waste	8-oz wide mouth jar	1 8-oz jar	none required (ice preferred)	none (try not to exceed 14 days)

MINIMUM LABORATORY QUALITY CONTROL MEASURES

The laboratory should have Standard Operating Procedures available for review for the semivolatile organic compound analyses and for all associated methods needed to complete the semivolatile analysis, such as total solids, instrument maintenance, sample handling, and sample documentation procedures. In addition, the laboratory should have a Laboratory Quality Assurance/Quality Control Statement available for review which includes all key personnel qualifications.

QC TYPE	FREQUENCY OF ANALYSIS	ACCEPTABLE LIMITS
Gas Chromatograph/Mass Spectrometer (GC/MS) Tuning	Once per day or more frequently if required by method	See method criteria for acceptable limits
Initial Calibration	Prior to analysis of samples (minimum three concentration levels for every compound and an instrument blank)	% Relative Standard Deviation of Response Factors of ≤ 30 (see method for any allowable variations), and a minimum Response Factor of ≥ 0.05 (see method for calculation)
Continuing Calibration	Once per day (mid-level standard containing all compounds) or more frequently if required by method	% Difference for Response Factor of ≤ 25 (see method for any allowable variations), and a minimum Response Factor of ≥ 0.05 (see method for calculation)
Method Blank	Once per extraction batch	See method for allowable limits
Internal Standards	Six per sample (see method for suggested internal standard compounds)	-50% to + 100% of Daily standard area and retention time shift (limits depend if packed or capillary column, see method)

Matrix Spike/Matrix Spike Duplicate	One set of MS/MSD per 20 samples or analysis set	See method for allowable limits
Surrogate Spikes	Added to each sample (see method for suggested surrogate compounds)	Report recovery

MINIMUM DATA PACKAGE REQUIREMENTS

- Sample results in a tabular form (if soil or sediment) reported on a dry weight basis.
- Report % moisture or % solids for all soil and sediment samples.
- Report sample volumes or weights, as well as any dilution factors, for each sample analysis.
- Return copy of the chain of custody form sent with the samples with laboratory receipt acknowledgment, and the internal or laboratory chain of custody forms.
- Method blank results.
- GC/MS tuning data summary.
- GC/MS initial and continuing calibration data summary forms.
- GC/MS internal standard data for samples and associated daily standard.
- Surrogate spike recoveries, either on a separate table or with the results, including laboratory QC limits.
- Matrix spike recovery tables, including laboratory recovery and relative percent difference QC limits.
- Date samples were analyzed, on a separate sheet, tune sheet, or results page.
- Optional: sample, standard and blank chromatograms, quantitation sheets, mass spectra, instrument run logs, and total solids logs.

Note: The optional QC must be maintained by laboratory for at least one year for possible future QC audits.

United States Environmental Protection Agency, 1650 Arch Street, Philadelphia, PA 19103-2029
Phone: (800) 438-2474

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs

September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ANTHRACENE

1. Product Identification

Synonyms: Paranaphthalene; Green Oil; Anthracene 90-95%
CAS No.: 120-12-7
Molecular Weight: 178.23
Chemical Formula: $(C_6H_4CH)_2$
Product Codes: B490

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	H
Anthracene	120-12-7	99 - 100%	

3. Hazards Identification

Emergency Overview

WARNING! MAY CAUSE IRRITATION TO SKIN, EYES, AND

unconscious person. Get medical attention.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Call a physician if irritation persists.

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5. Fire Fighting Measures

Fire:
Flash point: 121C (250F) CC
Low fire hazard when exposed to heat or flames.
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed. Will burst into flame on contact with chromic acid.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

Material Safety Data Sheet
Pyrene, 98+%(gc)

ACC# 27452

Section 1 - Chemical Product and Company Identification

MSDS Name: Pyrene, 98+%(gc)
Catalog Numbers: AC180830000, AC180830250, AC180831000, AC180832500
Synonyms: Benzo[def]phenanthrene
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
129-00-0	Pyrene, ca	96.0	204-927-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow powder.
Danger! Cancer hazard. May be fatal if inhaled. Causes respiratory tract irritation. May be harmful if swallowed. Causes skin irritation. May cause eye irritation. May cause cancer based on animal studies. The toxicological properties of this material have not been fully investigated.
Target Organs: None known.

Potential Health Effects
Eye: May cause eye irritation.
Skin: Causes skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis. Dermal applications may cause hyperemia (an excess of blood in a part), weight loss, and hematopoietic changes.
Ingestion: May cause digestive tract disturbances. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.
Inhalation: May be fatal if inhaled. Causes respiratory tract irritation. Inhalation of dust may cause respiratory tract irritation.
Chronic: May cause cancer according to animal studies. Chronic effects may include leukocytosis and lengthened chronaxy of the leg muscle flexors.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Pyrene, ca	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Pyrene, ca: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow
Odor: None reported.
pH: Not available.
Vapor Pressure: < 1 mm Hg @20C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 404 deg C @ 760.00mmHg
Freezing/Melting Point:156 deg C
Decomposition Temperature: Not available.
Solubility: 1.271
Specific Gravity/Density: Not available.
Molecular Formula:C16H10
Molecular Weight:202.25

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Physical: No information available.
Other: Reported BCF: rainbow trout, 72); goldfish, 457; fathead minnow, 600-970. Based on these values, minimal to moderate bioconcentration of pyrene in aquatic organisms would be expected.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 129-00-0 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 129-00-0: Effective 6/1/87, Sunset 6/1/97
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 129-00-0: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 129-00-0: 1000 lb TPQ (lower threshold); 10000 lb TPQ (upper thre shold)

SARA Codes
CAS # 129-00-0: acute, chronic.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

BENZ(a)ANTHRACENE
1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

CAS # 56-55-3
RTECS # CV9275000
ICSC # 0385
EC # 601-033-00-9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety goggles, face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in seafood.

NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name.

ADDITIONAL INFORMATION

ICSC: 0385

BENZ(a)ANTHRACENE

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not applicable.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: ; Flammability: 1; Instability:

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Avoid breathing dust.
Storage: Store in a tightly closed container. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 218-01-9: GC0700000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Suspect carcinogen (listed as Polycyclic aromatic hydrocarbons).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Neurotoxicity: No information available.
Mutagenicity: Chrysene was mutagenic to S. Typhimurium in the presence of an exogenous metabolic system.
Other Studies: Genotoxicity : Salmonella typhimurium TA97,TA98,TA100 with metabolic activation positive (Sakai.M.et al Mutat.Res1985); Saccharomyces cerrevisae (Miotic recombination) D3 strain 330mg/kg negative.

Section 12 - Ecological Information

Ecotoxicity: Water flea LC50 = 1.9 mg/L; 2 Hr.; Unspecified Fish toxicity : LC50 (96hr) Neauthes arenacedentata >1ppm.(Rossi,S.S. et al Marine Pollut. Bull. 1978) Invertebrate toxicity : lethal treshold concentration (24hr) Daphnia Magna 0,7æg/l.(* Newsted,J.L. et al Environ. Toxicol. Chem. 1987) Bioaccumulation : 24hr Daphnia Magna log bioconcentration factor 3.7845 (*)
Environmental: Degradation studies : biodegradated by white rot fungus (Proc.Annu.Meet.Am.Wood-Preserv.Assoc.1989) May be utilised by axenic cultures of microorganisms e.g. Pseudomonas pancimobilis EPA505, which may have novel degradative systems(Mueller,J.G. et al ppl.Environ.Microbiol.1990; Mueller, J.G. et al Environ.Sci.Technol.1991).
Physical: Not found.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Chrysene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 218-01-9: 0.35 æg/day NSRL (oral)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 218-01-9: No information available.

Canada - DSL/NDSL

CAS# 218-01-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

Canadian Ingredient Disclosure List

CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/30/1999

Material Safety Data Sheet
Benzo[a]pyrene, 98%

ACC# 37175

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[a]pyrene, 98%
Catalog Numbers: AC105600000, AC105600010, AC105601000, AC377200000, AC377200010, AC377201000 AC377201000
Synonyms: 3,4-Benzopyrene; 3,4-Benzpyrene; Benzo[def]chrysene.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
50-32-8	Benzo[a]pyrene	>96	200-028-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow to brown powder.
Danger! May cause heritable genetic damage. Cancer hazard. May cause harm to the unborn child. May impair fertility. May cause eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Target Organs: Reproductive system.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. May be harmful if inhaled.
Chronic: May cause cancer in humans. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzo[a]pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Benzo[a]pyrene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow to brown
Odor: faint aromatic odor
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 495 deg C @ 760 mm Hg
Freezing/Melting Point:175 - 179 deg C
Decomposition Temperature: Not available.
Solubility: 1.60x10-3 mg/l @25°C
Specific Gravity/Density: Not available.
Molecular Formula:$C_{20}H_{12}$
Molecular Weight:252.31

RCRA U-Series:
CAS# 50-32-8: waste number U022.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a}-pyrene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a}-pyrene)
Hazard Class:	9	9
UN Number:	UN3077	UN3077
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 50-32-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 50-32-8: acute, chronic.
Section 313
This material contains Benzo[a]pyrene (CAS# 50-32-8, >96%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 50-32-8 can be found on the following state right to know lists: California,

shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 2 - Moderate
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of dust or vapors can cause headache, nausea, vomiting, extensive sweating, and disorientation. The predominant reaction is delayed intravascular hemolysis with symptoms of anemia, fever, jaundice, and kidney or liver damage.
Ingestion:
Toxic. Can cause headache, profuse perspiration, listlessness, dark urine, nausea, vomiting and disorientation. Intravascular hemolysis may also occur with symptoms similar to those noted for inhalation. Severe cases may produce coma with or without convulsions. Death may result from renal failure.
Skin Contact:
Can irritate the skin and, on prolonged contact, may cause rashes and allergy. "Sensitized" individuals may suffer a severe dermatitis.
Eye Contact:
Vapors and solid causes irritation, redness and pain. Very high exposures can damage the nerves of the eye.
Chronic Exposure:
Has led to cataract formation in eyes. May cause skin allergy.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin, blood or vascular disorders or impaired respiratory function may be more susceptible to the effects of the substance. Particularly susceptible individuals are found in the general population, most commonly in dark skinned races.

manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Keep away from moisture and oxidizers. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
10 ppm, 50 mg/m3.

- ACGIH Threshold Limit Value (TLV):
TWA= 10 ppm, 52 mg/m3
STEL= 15 ppm, 79 mg/m3.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use

Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, strong alkalis and strong mineral acids, mixtures of aluminum trichloride and benzoyl chloride. Reacts violently with chromic anhydride. Melted naphthalene will attack some forms of plastics, rubber, and coatings.
Conditions to Avoid:
Avoid heat, sparks, flames and other ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 490 mg/kg;
Inhalation rat LC50: 340 mg/m3, 1 hour;
Skin rabbit LD50: > 20 g/kg;
Irritation data: skin (open Draize) rabbit 495 mg, mild; eye (standard Draize) rabbit 100 mg, mild;
Investigated as a tumorigen, mutagen and reproductive effector.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Categ
Naphthalene (91-20-3)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released into water, this material is expected to have a half-life between 1 and 10 days. This material may bioaccumulate to some extent. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
No information found.

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Naphthalene (91-20-3)	Yes	Yes	No	Yes

---------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	-------SARA 313-- List	Chemical C
Naphthalene (91-20-3)	No	No	Yes	No

---------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Naphthalene (91-20-3)	100	U165	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: 2Z
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.
Label Precautions:
Avoid contact with eyes, skin and clothing.
Avoid prolonged or repeated contact with skin.
Avoid breathing dust.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

This information was last updated on July 15, 2004. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

given here.)

ORL-RAT LDLO 1500 mg kg^{-1}

IPR-RAT LDLO 250 mg kg^{-1}

ITR-RAT LDLO 25 mg kg^{-1}

IPR-MUS LDLO 100 mg kg^{-1}

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
Hazard class 4.1. Packing group III. UN No 1325.

Personal protection

Safety glasses and gloves. Good ventilation and an inert atmosphere if working with powdered material.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

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given here.)

IPR-MUS LD50 3.5 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R11 R36 R37 R38 (all for the powdered material only).

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN Nos: 3089 (very fine powder), 3077 (fine powder); otherwise considered non-hazardous for air, sea and road freight.

Personal protection

Suitable ventilation if handling powder.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

This information was last updated on November 16, 2004. Although we have tried to make it as accurate and useful as possible, we can take no responsibility for its use or misuse.

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spontaneously. May react violently with titanium, ammonium nitrate, potassium perchlorate, hydrazoic acid. Incompatible with acids, oxidizing agents, sulfur.

Toxicology

Carcinogen. Toxic by all routes of entry. May cause sensitization by skin contact. Typical TLV 0.05 mg/m3

Toxicity data
(The meaning of any toxicological abbreviations which appear in this section is given here.)

IPR-RAT LD50 250 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R10 R17 R36 R37 R38 R40 R42 R43.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 3089. Packing group II. Hazard class 4.1.

Personal protection

Good ventilation. Wear gloves and safety glasses when handling the powder.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S16 S22 S26 S36.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

PESTICIDES AND PCBs

U.S. Environmental Protection Agency

Pesticides: Topical & Chemical Fact Sheets

Assessing Health Risks from Pesticides

January 1999
735-F-99-002

The Federal Government, in cooperation with the States, carefully regulates pesticides to ensure that they do not pose unreasonable risks to human health or the environment. As part of that effort, the Environmental Protection Agency (EPA) requires extensive test data from pesticide producers that demonstrate pesticide products can be used without posing harm to human health and the environment. EPA scientists and analysts carefully review these data to determine whether to register (license) a pesticide product or a use and whether specific restrictions are necessary. This fact sheet is a brief overview of EPA's process for assessing potential risks to human health when evaluating pesticide products.

Background

There are more than 865 active ingredients registered as pesticides, which are formulated into thousands of pesticide products that are available in the marketplace. About 350 pesticides are used on the foods we eat, and to protect our homes and pets.

EPA plays a critical role in evaluating these chemicals prior to registration, and in reevaluating older pesticides already on the market, to ensure that they can be used with a reasonable certainty of no harm. The process EPA uses for evaluating the health impacts of a pesticide is called risk assessment.

EPA uses the National Research Council's four-step process for human health risk assessment:

- **Step One**: Hazard Identification
- **Step Two**: Dose-Response Assessment
- **Step Three**: Exposure Assessment
- **Step Four**: Risk Characterization

Step One: Hazard Identification (Toxicology)

The first step in the risk assessment process is to identify potential health effects that may occur from different types of pesticide exposure. EPA considers the full spectrum of a pesticide's potential health effects.

Generally, for human health risk assessments, many toxicity studies are conducted on animals by pesticide companies in independent laboratories and evaluated for acceptability by EPA scientists. EPA evaluates pesticides for a wide range of adverse effects, from eye and skin irritation to cancer and birth defects in laboratory animals. EPA may also consult the public literature or other sources of supporting information on any aspect of the chemical.

Step Two: Dose-Response Assessment

Paracelsus, the Swiss physician and alchemist, the "father" of modern toxicology (1493-1541) said,

> "The dose makes the poison."

In other words, **the amount of a substance a person is exposed to** is as important as **how toxic the chemical might be**. For example, small doses of aspirin can be beneficial to people, but at very high doses, this common medicine can be deadly. In some individuals, even at very low doses, aspirin may be deadly.

Dose-response assessment involves considering the dose levels at which adverse effects were observed in test animals, and using these dose levels to calculate an equal dose in humans.

Step Three: Exposure Assessment

People can be exposed to pesticides in three ways:

1. Inhaling pesticides (inhalation exposure),
2. Absorbing pesticides through the skin (dermal exposure), and
3. Getting pesticides in their mouth or digestive tract (oral exposure).

Depending on the situation, pesticides could enter the body by any one or all of these routes. Typical sources of pesticide exposure include:

- **Food**
  Most of the foods we eat have been grown with the use of pesticides. Therefore, pesticide residues may be present inside or on the surfaces of these foods.

- **Home and Personal Use Pesticides**
  You might use pesticides in and around your home to control insects.

EPA: Pesticides - Assessing Health Risks from Pesticides
Page 2 of 5

Step Two: Dose-Response Assessment

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Step Three: Exposure Assessment

People can be exposed to pesticides in three ways:

considered, and broad conclusions are made. EPA's role is to evaluate both toxicity and exposure and to determine the risk associated with use of the pesticide.

Simply put,

RISK = TOXICITY x EXPOSURE.

This means that the risk to human health from pesticide exposure depends on both the toxicity of the pesticide and the likelihood of people coming into contact with it. At least *some* exposure and *some* toxicity are required to result in a risk. For example, if the pesticide is very poisonous, but no people are exposed, there is no risk. Likewise, if there is ample exposure but the chemical is non-toxic, there is no risk. However, usually when pesticides are used, there is some toxicity and exposure, which results in a potential risk.

EPA recognizes that effects vary between animals of different species and from person to person. To account for this variability, *uncertainty factors* are built into the risk assessment. These uncertainty factors create an additional margin of safety for protecting people who may be exposed to the pesticides. FQPA requires EPA to use an extra 10-fold safety factor, if necessary, to protect infants and children from effects of the pesticide.

Types of Toxicity Tests EPA Requires for Human Health Risk Assessments

EPA evaluates studies conducted over different periods of time and that measure specific types of effects. These tests are evaluated to screen for potential health effects in infants, children and adults.

Acute Testing: Short-term exposure; a single exposure (dose).

- Oral, dermal (skin), and inhalation exposure
- Eye irritation
- Skin irritation
- Skin sensitization
- Neurotoxicity

Sub-chronic Testing: Intermediate exposure; repeated exposure over a longer period of time (i.e., 30-90 days).

- Oral, dermal (skin), and inhalation
- Neurotoxicity (nerve system damage)

Chronic Toxicity Testing: Long-term exposure; repeated exposure lasting for most of the test animal's life span. Intended to determine the effects of a pesticide after prolonged and repeated exposures.

- Chronic effects (non-cancer)
- Carcinogenicity (cancer)

Developmental and Reproductive Testing: Identify effects in the fetus of an exposed pregnant female (birth defects) and how pesticide exposure affects the ability of a test animal to successfully reproduce.

Mutagenicity Testing: Assess a pesticide's potential to affect the cell's genetic components.

Hormone Disruption: Measure effects for their potential to disrupt the endocrine system. The endocrine system consists of a set of glands and the hormones they produce that help guide the development, growth, reproduction, and behavior of animals including humans.

Risk Management

Once EPA completes the risk assessment process for a pesticide, we use this information to determine if (when used according to label directions), there is a reasonable certainty that the pesticide will not harm a person's health.

Using the conclusions of a risk assessment, EPA can then make a more informed decision regarding whether to approve a pesticide chemical or use, as proposed, or whether additional protective measures are necessary to limit occupational or non-occupational exposure to a pesticide. For example, EPA may prohibit a pesticide from being used on certain crops because consuming too much food treated with the pesticide may result in an unacceptable risk to consumers. Another example of protective measures is requiring workers to wear personal protective equipment (PPE) such as a respirator or chemical resistant gloves, or not allowing workers to enter treated crop fields until a specific period of time has passed.

If, after considering all appropriate risk reduction measures, the pesticide still does not meet EPA's safety standard, the Agency will not allow the proposed chemical or use. Regardless of the specific measures enforced, EPA's primary goal is to ensure that legal uses of the pesticide are protective of human health, especially the health of children, and the environment.

Human Health Risk Assessment and the Law

Federal law requires detailed evaluation of pesticides to protect human health and the environment. In 1996, Congress made significant changes to strengthen pesticide laws through the Food Quality Protection Act (FQPA). Many of these changes are key elements of the current risk assessment process. FQPA required that EPA consider:

- **A New Safety Standard**: FQPA strengthened the safety standard that pesticides must meet before being approved for use. EPA must ensure with a reasonable certainty that no harm will result from the legal uses of the pesticide.
- **Exposure from All Sources**: In evaluating a pesticide, EPA must estimate the combined risk from that pesticide from all non-occupational sources, such as:
  - Food Sources
  - Drinking Water Sources
  - Residential Sources
- **Cumulative Risk**: EPA is required to evaluate pesticides in light of similar toxic effects that different pesticides may share, or "a common mechanism of toxicity." At this time, EPA is developing a methodology for this type of assessment.
- **Special Sensitivity of Children to Pesticides**: EPA must ascertain whether there is an increased susceptibility from exposure to the pesticide to infants and children. EPA must build an additional 10-fold safety factor into risk assessments to ensure the protection of infants and children, unless it is determined that a lesser margin of safety will be safe for infants and children.

For More Information

If you would like more information about EPA's pesticide programs, contact the Communication Service Branch at (703) 305-5017 or visit the Pesticides Web site.

For more information on specific pesticides, or to inquire about the symptoms of pesticide poisoning, call the National Pesticide Information Center (NPIC), a toll-free hotline information at: 1-800-858-7378, or visit their Web site EXIT disclaimer.

What is a Pesticide?

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses. Though often misunderstood to refer only to *insecticides*, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests. Under United States law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

Many household products are pesticides. Did you know that all of these common products are considered pesticides?

- Cockroach sprays and baits
- Insect repellents for personal use.
- Rat and other rodent poisons.
- Flea and tick sprays, powders, and pet collars.
- Kitchen, laundry, and bath disinfectants and sanitizers.
- Products that kill mold and mildew.
- Some lawn and garden products, such as weed killers.
- Some swimming pool chemicals.

By their very nature, most pesticides create some risk of harm to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms. At the same time, pesticides are useful to society because of their ability to kill potential disease-causing organisms and control insects, weeds, and other pests. In the United States, the Office of Pesticide Programs of the Environmental Protection Agency is chiefly responsible for regulating pesticides. Biologically-based pesticides, such as pheromones and microbial pesticides, are becoming increasingly popular and often are safer than traditional chemical pesticides.

Here are some common kinds of pesticides and their function:

Algicides
Control algae in lakes, canals, swimming pools, water tanks, and other sites.
Antifouling agents
Kill or repel organisms that attach to underwater surfaces, such as boat bottoms.
Antimicrobials
Kill microorganisms (such as bacteria and viruses).
Attractants
Attract pests (for example, to lure an insect or rodent to a trap). (However, food is not onsidered a pesticide when used as an attractant.)
Biocides
Kill microorganisms.
Disinfectants and sanitizers
Kill or inactivate disease-producing microorganisms on inanimate objects.
Fungicides
Kill fungi (including blights, mildews, molds, and rusts).
Fumigants
Produce gas or vapor intended to destroy pests in buildings or soil.

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQs™

February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

[illegible]

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

- PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

- Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- Breathing air near hazardous waste sites and drinking contaminated well water.
- In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

❑ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.

❑ Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.

❑ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.

❑ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

METALS

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Go!

Heavy Metals

Contact

Introduction

The **term heavy** metal refers to any metallic chemical element that h. and is toxic or poisonous at low concentrations. Examples of heavy m (Hg), cadmium (Cd), arsenic (As), chromium (Cr), thallium (Tl), and le

Heavy metals are natural components of the Earth's crust. They cannot be degraded or destroyed. enter our bodies via food, drinking water and air. As trace elements, some heavy metals (e.g. coppe essential to maintain the metabolism of the human body. However, at higher concentrations they ca metal poisoning could result, for instance, from drinking-water contamination (e.g. lead pipes), high concentrations near emission sources, or intake via the food chain.

Heavy metals are dangerous because they tend to **bioaccumulate.** Bioaccumulation means an incr of a chemical in a biological organism over time, compared to the chemical's concentration in the en accumulate in living things any time they are taken up and stored faster than they are broken down excreted.

Heavy metals can enter a water supply by industrial and consumer waste, or even from acidic rain b releasing heavy metals into streams, lakes, rivers, and groundwater.

Environmental and health risks.

Now we are going to describe the effects of the heavy metals in the environment. The three most po Lead, Cadmium, and Mercury.

Effects of Antimony on the environment

Antimony is a metal used in the compound antimony trioxide, a flame retardant. It can also be foun and ceramics and glass. Exposure to high levels of antimony for short periods of time causes nause There is little information on the effects of long-term antimony exposure, but it is a suspected huma antimony compounds do not bioaccumulate in aquatic life.

Effects of Cadmium on the environment

Cadmium derives its toxicological properties from its chemical similarity to zinc an essential micronu and humans. Cadmium is biopersistent and, once absorbed by an organism, remains resident for m. for humans) although it is eventually excreted.

In humans, long-term exposure is associated with renal disfunction. High exposure can lead to obst has been linked to lung cancer, although data concerning the latter are difficult to interpret due to c Cadmium may also produce bone defects (*osteomalacia, osteoporosis*) in humans and animals. In a linked to increased blood pressure and effects on the myocardium in animals, although most human findings.

The average daily intake for humans is estimated as 0.15µg from air and 1µg from water. Smoking can lead to the inhalation of around 2-4µg of cadmium, but levels may vary widely.

In what form is emitted Cadmium?

Cadmium is produced as an inevitable by-product of zinc (or occasionally lead) refining, since these within the raw ore. However, once collected the cadmium is relatively easy to recycle.

The most significant use of cadmium is in nickel/cadmium batteries, as rechargeable or secondary p high output, long life, low maintenance and high tolerance to physical and electrical stress. Cadmiur corrosion resistance, particularly in high stress environments such as marine and aerospace applicat reliability is required; the coating is preferentially corroded if damaged. Other uses of cadmium are PVC, in alloys and electronic compounds. Cadmium is also present as an impurity in several product fertilisers, detergents and refined petroleum products.

In the general, non-smoking population the major exposure pathway is through food, via the additic agricultural soil from various sources (atmospheric deposition and fertiliser application) and uptake Additional exposure to humans arises through cadmium in ambient air and drinking water.

Effects of Chromium on the environment

Chromium is used in metal alloys and pigments for paints, cement, paper, rubber, and other materi can irritate the skin and cause ulceration. Long-term exposure can cause kidney and liver damage, circulatory and nerve tissue. Chromium often accumulates in aquatic life, adding to the danger of e been exposed to high levels of chromium.

Effects of Copper on the environment

Copper is an essential substance to human life, but in high doses it can cause anemia, liver and kidr and intestinal irritation. People with Wilson's disease are at greater risk for health effects from overe Copper normally occurs in drinking water from copper pipes, as well as from additives designed to c

Effects of Lead on the environment

In humans exposure to lead can result in a wide range of biological effects depending on the level a Various effects occur over a broad range of doses, with the developing foetus and infant being more High levels of exposure may result in toxic biochemical effects in humans which in turn cause proble haemoglobin, effects on the kidneys, gastrointestinal tract, joints and reproductive system, and acu the nervous system.

Lead poisoning, which is so severe as to cause evident illness, is now very rare indeed. At intermedi however, there is persuasive evidence that lead can have small, subtle, subclinical effects, particula developments in children. Some studies suggest that there may be a loss of up to 2 IQ points for a from 10 to 20µg/dl in young children.

Average daily lead intake for adults in the UK is estimated at 1.6µg from air, 20µg from drinking wa Although most people receive the bulk of their lead intake from food, in specific populations other s important, such as water in areas with lead piping and plumbosolvent water, air near point of sourc paint flakes in old houses or contaminated land. Lead in the air contributes to lead levels in food thr and rain containing the metal, on crops and the soil. For the majority of people in the UK, however, well below the provisional tolerable weekly intake recommended by the UN Food and Agriculture Or Health Organisation.

In what form is emitted lead?

Lead in the environment arises from both natural and anthropogenic sources. Exposure can occur tł food, air, soil and dust from old paint containing lead. In the general non-smoking, adult population pathway is from food and water. Food, air, water and dust/soil are the major potential exposure pat young children. For infants up to 4 or 5 months of age, air, milk formulae and water are the signific

Lead is among the most recycled non-ferrous metals and its secondary production has therefore grc declining lead prices. Its physical and chemical properties are applied in the manufacturing, constru industries. It is easily shaped and is malleable and ductile. There are eight broad categories of use: (no longer allowed in the EU), rolled and extruded products, alloys, pigments and compounds, cable ammunition.

Effects of Mercury on the environment

Mercury is a toxic substance which has no known function in human biochemistry or physiology and in living organisms. Inorganic mercury poisoning is associated with tremors, gingivitis and/or minor together with spontaneous abortion and congenital malformation.

Monomethylmercury causes damage to the brain and the central nervous system, while foetal and p given rise to abortion, congenital malformation and development changes in young children.

In what form is emitted Mercury?

Mercury is a global pollutant with complex and unusual chemical and physical properties. The major is the degassing of the Earth's crust, emissions from volcanoes and evaporation from natural bodies

World-wide mining of the metal leads to indirect discharges into the atmosphere. The usage of merc industrial processes and in various products (e.g. batteries, lamps and thermometers). It is also wic amalgam for fillings and by the pharmaceutical industry. Concern over mercury in the environment toxic forms in which mercury can occur.

Mercury is mostly present in the atmosphere in a relatively unreactive form as a gaseous element. T lifetime (of the order of 1 year) of its gaseous form means the emission, transport and deposition of

Natural biological processes can cause methylated forms of mercury to form which bioaccumulate o concentrate in living organisms, especially fish. These forms of mercury: monomethylmercury and c toxic, causing neurotoxicological disorders. The main pathway for mercury to humans is through the inhalation.

The main sources of mercury emissions in the UK are from the manufacture of chlorine in mercury c production, coal combustion and crematoria. UK emissions of mercury are uncertain and it is estima 13 to 36 tonnes per year (DERA). Emissions are estimated to have declined by around ¾'s between due to improved controls on mercury cells and their replacement, and the fall in coal use.

Whilst there has been a decline in the level of European emissions of mercury, emissions from outsi to increase – increasing the level of ambient concentrations in the continent.

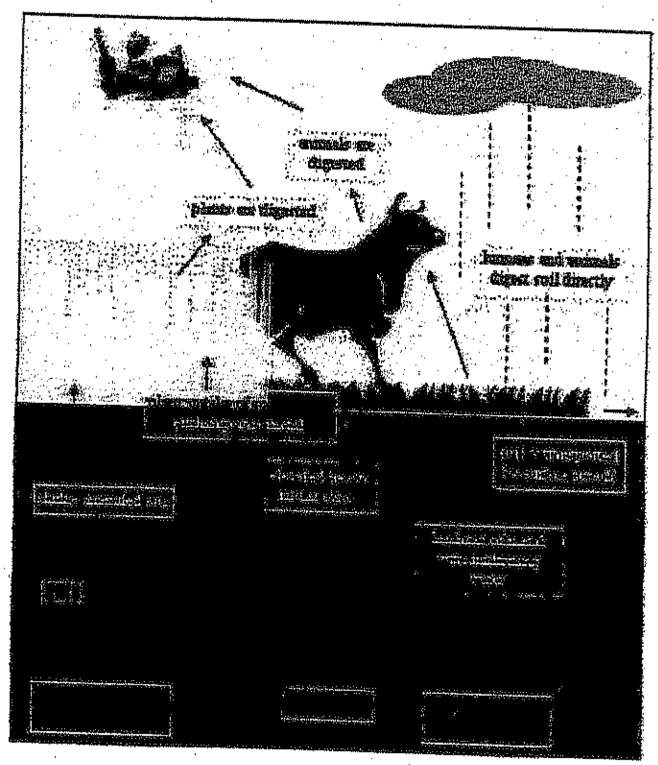
effects of Nickel on the environment

Small amounts of Nickel are needed by the human body to produce red blood cells, however, in exc become mildly toxic. Short-term overexposure to nickel is not known to cause any health problems, can cause decreased body weight, heart and liver damage, and skin irritation. The EPA does not cur levels in drinking water. Nickel can accumulate in aquatic life, but its presence is not magnified alon

Effects of Selenium on the environment

Selenium is needed by humans and other animals in small amounts, but in larger amounts can caus system, fatigue, and irritability. Selenium accumulates in living tissue, causing high selenium conter organisms, and causing greater health problems in human over a lifetime of overexposure. These h and fingernail loss, damage to kidney and liver tissue, damage to circulatory tissue, and more sever system.

Heavy Metals adsorption process:



In the picture we can observe the way that follows the havy metals from the first step of the polluti human body by menas the food.

The most importants disasters with heavy metals:

1932

Minamata
Sewage containing mercury is released by Chisso's chemicals works into Minimata Bay in Japan. The mercury accumulates in sea creatures, leading eventually to mercury poisoning in the population.
1952
Minamata Syndrome
In 1952, the first incidents of mercury poisoning appear in the population of Minimata Bay in Japan, caused by consumption of fish polluted with mercury, bringing over 500 fatalities. Since then, Japan has had the strictest environmental laws in the industrialised world.
1986-11-01
Sandoz
Water used to extinguish a major fire carries c. 30 t fungicide containing mercury into the Upper Rhine. Fish are killed over a stretch of 100 km. The shock drives many FEA projects forwards. See also "Pollution of the Rhine at Basel / Sandoz".
1998-04
Spanish nature reserve contaminated after environmental disaster
Toxic chemicals in water from a burst dam belonging to a mine contaminate the Coto de Donana nature reserve in southern Spain. C. 5 million m_ of mud containing sulphur, lead, copper, zinc and cadmium flow down the Rio Guadimar. Experts estimate that Europe's largest bird sanctuary, as well as Spain's agriculture and fisheries, will suffer permanent damage from the pollution.

Suggested reading for Heavy Metals

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MSDS Number: A7441 * * * * * *Effective Date: 11/12/03* * * * * * *Supercedes: 02/23/01*

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ARSENIC, 1,000 UG/ML OR 10,000 UG/ML

1. Product Identification

Synonyms: None
CAS No.: Not applicable to mixtures.
Molecular Weight: Not applicable to mixtures.
Chemical Formula: Not applicable to mixtures.
Product Codes: 5704, 5718, 6442

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Arsenic	7440-38-2	0.1 - 1%	Yes
Nitric Acid	7697-37-2	< 4%	Yes
Water	7732-18-5	> 95%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. AFFECTS LIVER, KIDNEYS, LUNGS AND TEETH. CANCER HAZARD. CONTAINS INORGANIC ARSENIC WHICH CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms which are referenced in the descriptions below.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract. Arsenic may cause inflammation of the mucous membranes with cough and foamy sputum, restlessness, dyspnea, cyanosis, and rales. Symptoms like those from ingestion exposure may follow. May cause pulmonary edema.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. Arsenic is highly toxic! May cause burning in esophagus, vomiting, and bloody diarrhea. Symptoms of cold and clammy skin, low blood pressure, weakness, headache, cramps, convulsions, and coma may follow. May cause damage to liver and kidneys. A suspected fetal toxin. Death may occur from circulatory failure. Estimated lethal dose 120 milligrams.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid. Arsenic on repeated or prolonged skin contact may cause bronzing of the skin, edema, dermatitis, and lesions. Repeated or prolonged inhalation of dust may cause damage to the nasal septum. Chronic exposure from inhalation or ingestion may cause hair and weight loss, a garlic odor

to the breath and perspiration, excessive salivation and perspiration, central nervous system damage, hepatitis, gastrointestinal disturbances, cardiovascular damage, and kidney and liver damage. Arsenic compounds are known human carcinogens and may be teratogenic based on effects in laboratory animals.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance. First aid procedures given apply to concentrated solutions. Exposures to dilute solutions may not require these extensive first aid procedures.

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

If swallowed, give large quantities of water to drink and get medical attention immediately. Never give anything by mouth to an unconscious person.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to this substance.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

If emesis if unsuccessful after two doses of Ipecac, consider gastric lavage. Monitor urine arsenic level. Alkalization of urine may help prevent disposition of red cell breakdown products in renal tubular cells. If acute exposure is significant, maintain high urine output and monitor volume status, preferably with central venous pressure line. Abdominal X-rays should be done routinely for all ingestions. Chelation therapy with BAL, followed by n-penicillamine is recommended, but specific dosing guidelines are not clearly established.

---

5. Fire Fighting Measures

Fire:

Not combustible, but concentrated material is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

Explosion:

Concentrated material reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

If involved in a fire, use water spray.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

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7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For Nitric Acid:

OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)
For Inorganic Arsenic compounds (as As):
- OSHA Permissible Exposure Limit (PEL):
10 ug/m3 (TWA), 5 ug/m3(Action Level), cancer hazard.
- ACGIH Threshold Limit Value (TLV):
0.01 mg/m3 (TWA), A1, confirmed human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective.

Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
Any area where inorganic arsenic is stored, handled, used, etc., must be established as a 'Regulated Area' with controlled access, limited to authorized persons. Containers of inorganic arsenic and Regulated Areas must be labeled to show a CANCER SUSPECT AGENT is present. Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing arsenic or lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (arsenic: 29 CFR 1910 .1018; lead: 29 CFR 1910.1025).

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Odorless.
Solubility:
Infinitely soluble.
Specific Gravity:
No information found.
pH:
No information found.
% Volatiles by volume @ 21C (70F):

> 99

Boiling Point:
No information found.
Melting Point:
No information found.
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Emits toxic fumes of arsenic when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Heat, incompatibles.

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11. Toxicological Information

Toxicological Data:
For arsenic: oral rat LD50: 763 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector. For Nitric Acid: Investigated as a mutagen and reproductive effector.
Carcinogenicity:
For arsenic and inorganic arsenic compounds:
Regulated by OSHA as a carcinogen.
EPA / IRIS classification: Group A - Known human carcinogen.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Arsenic (7440-38-2)	Yes	No	1
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

International (Air, I.C.A.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Arsenic (7440-38-2)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Arsenic (7440-38-2)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Arsenic (7440-38-2)	No	No	Yes	Arsenic comp
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Arsenic (7440-38-2)	1	No	No
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL

BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. AFFECTS LIVER, KIDNEYS, LUNGS AND TEETH. CANCER HAZARD. CONTAINS INORGANIC ARSENIC WHICH CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs

April 1999

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

[illegible]

What is mercury?
(Pronounced mŭr′kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- Eating fish or shellfish contaminated with methylmercury.
- Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

LEAD
CAS # 7439-92-1

Agency for Toxic Substances and Disease Registry ToxFAQs

June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

What is lead?

(Pronounced lĕd)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.
- Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

How might I be exposed to lead?

- Eating food or drinking water that contains lead.
- Spending time in areas where lead-based paints have been used and are deteriorating.
- Working in a job where lead is used.
- Using health-care products or folk remedies that contain lead.
- Engaging in certain hobbies in which lead is used (for example, stained glass).

How can lead affect my health?

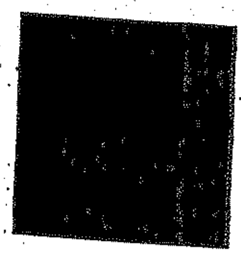
Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably

Safety (MSDS) data for beryllium



General

Synonyms: glucinium
Molecular formula: Be
CAS No: 7440-41-7
EINECS No: 231-150-7
EU No: 004-001-00-7

Physical data

Appearance: silvery solid or grey foil
Melting point: 1278 C
Boiling point: 2970 C
Vapour density:
Vapour pressure:
Density (g cm^{-3}): 1.85
Flash point:
Explosion limits:
Autoignition temperature:
Water solubility: insoluble

Stability

Stable. Incompatible with acids, bases, oxidizing agents, halogen

pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
340C (644F)
Melting Point:
217C (423F)
Vapor Density (Air=1):
6.15
Vapor Pressure (mm Hg):
1 @ 145C (293F) (sublimes)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Darkens on exposure to light.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Fluorine, chromic acid, oxidizing agents.
Conditions to Avoid:
No information found.

---

11. Toxicological Information

Oral mouse LD: > 17,000 mg/kg. Irritation skin, Draize mouse: 118 ug mild. Investigated as a tumorigen and mutagen. IARC 3.

--------\Cancer Lists\--------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Categ
Anthracene (120-12-7)	No	No	3

---

12. Ecological Information

Anthracene (120-12-7)	No	No	Yes	No

----------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Anthracene (120-12-7)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **1** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION.
Label Precautions:
Keep container closed.
Use with adequate ventilation.
Avoid breathing dust.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

Safety (MSDS) data for zinc

Click here for data on zinc in student-friendly format, from the HSci project

General

Synonyms: zinc dust, zinc powder, blue powder, granular zinc, zinc foil, LS 2, LS 6, merrillite, zinc metal
Molecular formula: Zn
CAS No: 7440-66-6
EINECS No: 231-175-3
EC number: 030-001-00-1

Physical data

Appearance: silver or blueish-white foil or powder
Melting point: 420 C
Boiling point: 908 C
Vapour density:
Vapour pressure:
Density (g cm^{-3}): 7.14
Flash point:
Explosion limits:
Autoignition temperature:
Water solubility:

Stability

Stable. Incompatible with amines, cadmium, sulfur, chlorinated solvents, strong acids, strong bases. Air and moisture sensitive. **Powder or dust is very flammable.**

Abbreviations used in Toxicity data

The table below gives the main abbreviations which will be found in the toxicity data for chemicals listed on these (and many other) web pages.

asn	Aspergillus nidulans
ast	Ascites tumor
bcs	Bacillus subtilis
bfa	body fluid assay
bmr	bone marrow
brd	bird (domestic or lab)
bwd	wild bird species
chd	child
ckn	chicken
CL	ceiling concentration
clr	Chlamydomonas reinhardi
ctl	cattle
cyt	cytogenetic analysis
D	day
dck	duck
dlt	cominant lethal test
dmg	Drosophila melanogaster
dnd	DNA damage
dni	DNA inhibition
dnr	nNA repair
dns	unscheduled DNA synthesis
dom	domestic animal (goat, sheep)
dpo	Drcsophila pseudo-obscura
emb	embryo
esc	Escherichia cold
eug	Euglena gracilis

itt	intratesticular
iu	international unit
iut	intrauterine
ivg	intravaginal
ivn	intravenous
kdy	kidney
kg	kilogram
klp	Klebsiella pneumoniae
L	liter
LC50	lethal concentration 50 percent kill
LCLo	lowest published lethal concentration
LD50	lethal dose 50 percent kill
LDlo	lowest published lethal dose
leu	leukocyte
Liq	liquid
lng	lung
lvr	liver
lym	lymphocyte
M	minute
m3	cubic meter
mam	mammal (species unspecified)
man	man
ug	microgram
umol	micromole
mg	milligram
mky	monkey
mL	milliliter
MLD	mild irritation effects
mma	microsomal mutagenicity assay
mmo	mutation in microorganisms
mmol	millimole
mmr	mammary gland
mnt	micronucleus test
MOD	moderate irritation effects

ppt	parts per trillion (v/v)
preg	pregnant
qal	quail
rat	rat
rbt	rabbit
rec	rectal
rns	rinsed with water
S	second
sal	salmon
sat	Salmonella typhimurium
sce	sister chromatic exchange
scu	subcutaneous
SEV	severe irritation effects
skn	administration onto skin
sln	sex chromosome loss and nondisjunction
slt	specific locus test
slw	silkworm
smc	Saccharomyces cerevisiae
spm	sperm morphology
spr	sperm
sql	squirrel
srm	Serratia marcescens
ssp	Schizosaccharomyces pombe
STEL	short term exposure limit
TC	toxic concentration (other than lowest concentration)
TCLo	lowest published toxic concentration
TD	toxic dose (other than lowest toxic dose)
TDLo	lowest published toxic dose
tes	testis
TLV	Threshold Limit Value
tod	toad
trk	turkey
trn	heritable translocation test
TWA	time weighted average

Risk Phrases

Chemical data sheets available in many countries now contain codes for certain "risk phrases", shown as R23, R45 etc. These risk phrase codes have the following meanings:

- R1 Explosive when dry.
- R2 Risk of explosion by shock, friction, fire or other source of ignition.
- R3 Extreme risk of explosion by shock, friction, fire or other sources of ignition.
- R4 Forms very sensitive explosive metallic compounds.
- R5 Heating may cause an explosion.
- R6 Explosive with or without contact with air.
- R7 May cause fire.
- R8 Contact with combustible material may cause fire.
- R9 Explosive when mixed with combustible material.
- R10 Flammable.
- R11 Highly flammable.
- R12 Extremely flammable.
- R13 Extremely flammable liquefied gas
- R14 Reacts violently with water.
- R15 Contact with water liberates extremely flammable gases.
- R16 Explosive when mixed with oxidizing substances.
- R17 Spontaneously flammable in air.
- R18 In use, may form inflammable/explosive vapour-air mixture.
- R19 May form explosive peroxides.
- R20 Harmful by inhalation.
- R21 Harmful in contact with skin.
- R22 Harmful if swallowed.
- R23 Toxic by inhalation.
- R24 Toxic in contact with skin.
- R25 Toxic if swallowed.

- R61 May cause harm to the unborn child.
- R62 Risk of impaired fertility.
- R63 Possible risk of harm to the unborn child.
- R64 May cause harm to breastfed babies.
- R65 Harmful: may cause lung damage if swallowed.
- R66 Repeated exposure may cause skin dryness or cracking.
- R67 Vapours may cause drowsiness and dizziness.
- R68 Possible risk of irreversible effects.

It is current safety policy at Oxford University that a written COSHH assessment **must** be provided when a substance to be used has been assigned any of the risk phrases R42, R43, R45, R46, R48, R49, R60 or R61. Other hazards may also dictate the preparation of a suitable COSHH assessment.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances

See also Packing Group.
For further details on the transport of dangerous goods, see the OECD Directorate web site.

Return to the Safety Glossary.
Return to the Safety home page of the Physical and Theoretical Chemistry Laboratory, Oxford University.

- S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S27 Take off immediately all contaminated clothing.
- S28 After contact with skin, wash immediately with plenty of soap-suds.
- S29 Do not empty into drains.
- S30 Never add water to this product.
- S33 Take precautionary measures against static discharges.
- S35 This material and its container must be disposed of in a safe way.
- S36 Wear suitable protective clothing.
- S37 Wear suitable gloves.
- S38 In case of insufficient ventilation, wear suitable respiratory equipment.
- S39 Wear eye / face protection.
- S40 To clean the floor and all objects contaminated by this material, use .... (there follows suitable cleaning material).
- S41 In case of fire and / or explosion do not breathe fumes.
- S42 During fumigation / spraying wear suitable respiratory equipment.
- S43 In case of fire use ... (there follows the type of fire-fighting equipment to be used.)
- S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible.)
- S46 If swallowed, seek medical advice immediately and show this container or label.
- S47 Keep at temperature not exceeding...
- S48 To be kept wet with (there follows a material name).
- S49 Keep only in the original container.
- S50 Do not mix with ...
- S51 Use only in well ventilated areas.
- S52 Not recommended for interior use on large surface areas

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

COPPER METAL

MSDS Number: C5170 — *Effective Date: 05/17/01*

1. Product Identification

Synonyms: C.I. 77400; Arwood Copper
CAS No.: 7440-50-8
Molecular Weight: 63.546
Chemical Formula: Cu
Product Codes:
J.T. Baker: 1714, 1720, 1732, 1736
Mallinckrodt: 1733, 4649

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Copper	7440-50-8	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER AND KIDNEYS. CHRONIC EXPOSURE MAY CAUSE TISSUE DAMAGE.

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard since the bulk solid does not burn, but very finely divided particles (ultra-fine powder) may burn in air.
Explosion:
Not considered to be an explosion hazard. Reactions with incompatibles may pose an explosion hazard. Liquid copper explodes on contact with water. High concentrations of finely divided copper particles in the air may present an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Avoid exposure to air and moisture. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Copper Dust and Mists, as Cu:
- OSHA Permissible Exposure Limit (PEL) -
1 mg/m3 (TWA)
- ACGIH Threshold Limit Value (TLV) -

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Copper becomes dull when exposed to air; on exposure to moist air it gradually converts to the carbonate. On long standing, a white, highly explosive peroxide deposit may form.
Hazardous Decomposition Products:
No information found.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Copper is incompatible with oxidizers, alkalis, acetylene, chlorine plus oxygen difluoride, phosphorus, nitric acid, potassium peroxide, 1-bromo-2-propyne, sulfur plus chlorates. Reacts violently with ammonium nitrate, bromates, iodates, chlorates, ethylene oxide, hydrozoic acid, potassium oxide, dimethyl sulfoxide plus trichloroacetic acid, hydrogen peroxide, sodium peroxide, sodium azide, sulfuric acid, hydrogen sulfide plus air, and lead azide. A potentially explosive reaction occurs with actylenic compounds. Copper ignites on contact with chlorine, fluorine (above 121C), chlorine trifluoride, and hydrazinum nitrate (above 70C). An incandescent reaction occurs with potassium dioxide.
Conditions to Avoid:
Incompatibles and prolonged exposure to air and moisture.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure. Investigated as a tumorigen and a reproductive effector.

```
--------\Cancer Lists\------------------------------------------------------
                                       ---NTP Carcinogen---
Ingredient                             Known    Anticipated    IARC Category
------------------------------------   -----    -----------    -------------
Copper (7440-50-8)                     No       No             None
```

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification CHROMIUM

Product Identification: CHROMIUM
Date of MSDS: 11/01/1993 **Technical Review Date:** 11/10/1995
FSC: 6810 **NIIN:** **LIIN:** 00N066370
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: HIGH-PURITY STANDARDS
Post Office Box: 30188
Manufacturer's Address1:
Manufacturer's Address2: CHARLESTON, SC 29417
Manufacturer's Country: US
General Information Telephone: 803-556-3411
Emergency Telephone: 803-556-3411
Emergency Telephone: 803-556-3411
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 0YZE5
Special Project Code: N

Contractor Information

Contractor's Name: HIGH-PURITY STANDARDS INC
Post Office Box: 30180
Contractor's Address1: 2040 SAVAGE RD
Contractor's Address2: CHARLESTON, SC 29417
Contractor's Telephone: 803-556-3411
Contractor's CAGE: 0YZE5

Section 2 - Compositon/Information on Ingredients CHROMIUM

METALS, HYDROXIDES, CARBONATES, CYANIDES.
Hazardous Decomposition Products:
NO, NO*2.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
CHROMIUM

Toxicological Information:
N/P

Section 12 - Ecological Information
CHROMIUM

Ecological Information:
N/P

Section 13 - Disposal Considerations
CHROMIUM

Waste Disposal Methods:
FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS FOR ACID WASTE.

Section 14 - MSDS Transport Information
CHROMIUM

Transport Information:
N/P

Section 15 - Regulatory Information
CHROMIUM

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
CHROMIUM

Other Information:
N/P

HAZCOM Label Information

Product Identification: CHROMIUM
CAGE: 0YZE5
Assigned Individual: N
Company Name: HIGH-PURITY STANDARDS INC
Company PO Box: 30180
Company Street Address1: 2040 SAVAGE RD
Company Street Address2: CHARLESTON, SC 29417 US
Health Emergency Telephone: 803-556-3411
Label Required Indicator: Y
Date Label Reviewed: 11/10/1995
Status Code: C
Manufacturer's Label Number:
Date of Label: 11/10/1995
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

Appendix C

Heat Stress and Cold Stress Guidelines

Heat Stress Guidelines

Form	Signs & Symptoms	Care	Prevention[3]
Heat Rash	Tiny red vesicles in affected skin area. If the area is extensive, sweating can be impaired.	Apply mild lotions and cleanse the affected area.	Cool resting and sleeping areas to permit skin to dry between heat exposures.
Heat Cramps	Spasm, muscular pain (cramps) in stomach area and extremities (arms and legs).	Provide replacement fluids with minerals (salt) such as Gatorade.	Adequate salt intake with meals[1]. ACCLIMATIZATION[2]
Heat Exhaustion	Profuse sweating, cool (clammy) moist skin, dizziness, confusion, pale skin color, faint, rapid shallow breathing, headache, weakness, and/or muscle cramps.	Remove from heat, sit or lie down, rest, replace lost water with electrolyte replacement fluids (water, Gatorade) take frequent sips of liquids in amounts greater than required to satisfy thirst.	ACCLIMATIZATION[2] Adequate salt intake with meals[1], only during early part of heat season. Ample water intake, frequently during the day.
Heat Stroke	HOT <u>Dry</u> Skin. Sweating has stopped. Mental confusion, dizziness, nausea, chills, severe headache, collapse, delirium, and/or coma.	HEAT STROKE IS A MEDICAL EMERGENCY • Remove from heat. • COOL THE BODY AS RAPIDLY AS POSSIBLE by immersing in cold (or cool) water, or splash with water and fan. • Call for Emergency Assistance. • Observe for signs of shock.	ACCLIMATIZATION[2] Initially moderate workload in heat (8 to 14 days). Monitor worker's activities.

<u>Footnotes</u>:

1.) American diets are normally high in salt, sufficient to aid acclimatization. However, during the early part of the heat season, (May, June), one extra shake of salt during one to two meals per day may help, so long as this is permitted by your physician. Check with your personal physician.

2.) ACCLIMATIZATION - The process of adapting to heat is indicated by worker's ability to perform hot jobs less fluid loss, lower concentrations of salt loss in sweat, and a reduced core (body) temperature and heart rate.

3.) Method to Achieve Acclimatization - Moderate work or exercise in hot temperatures during early part of heat season. Adequate salt (mineral) and water intake. Gradually increasing work time in hot temperatures. Avoid alcohol. Normally takes 8 to 14 days to achieve acclimatization. Lost rapidly, if removed from strenuous work (or exercise) in hot temperature for more than approximately 5 days.

Cold Stress Guidelines

Stress	Symptoms	What to do
Mild Hypothermia	• Body Temp 98 to 90°F • Shivering • Lack of coordination, stumbling, fumbling hands • Slurred speech • Memory loss • Pale, cold skin	• Move to warm area • Stay active • Remove wet clothes and replace with dry clothes or blankets • Cover the head • Drink warm (not hot) sugary drink
Moderate Hypothermia	• Body temp 90 to 86°F • Shivering stops • Unable to walk or stand • Confused and/or irrational	• All of the above, plus: o Call 911 o Cover all extremities completely o Place very warm objects, such as hot packs on the victim's head, neck, chest, and groin
Severe Hypothermia	• Body temp 86 to 78°F • Severe muscle stiffness • Very sleepy or unconscious • Ice cold skin • Death	• Call 911 • Treat victim very gently • Do not attempt to re-warm
Frostbite	• Cold, tingling, stinging, or aching feeling in the frostbitten area, followed by numbness • Skin color turns red, then purple, then white or very pale skin • Cold to the touch • Blisters in severe cases	• Call 911 • Do not rub the area • Wrap in soft cloth • If help is delayed, immerse in warm (not hot) water
Trench Foot	• Tingling, itching, or burning sensation • Blisters	• Soak feet in warm water, then wrap with dry cloth bandages • Drink a warm (not hot) sugary drink

Appendix D

Forms

Safety Briefing Log

Project Number:	Project Name:
Date:	Time:
Briefing Conducted by:	Signature:

This sign-in log documents the tailgate briefing conducted in accordance with the HASP. Personnel who perform work operations on site are required to attend each briefing and to acknowledge receipt of each briefing.

TOPICS COVERED (check all those covered):

☐ General PPE Usage	☐ Confined Space	☐ Excavation Safety
☐ Hearing Conservation	☐ Slips, Trips, Falls	☐ Confined Space
☐ Respiratory Protection	☐ Heat Stress	☐ Traffic Safety
☐ Personal Hygiene	☐ Cold Stresses	☐ Changes to the HASP
☐ Exposure Guidelines	☐ Site Control	☐ Initial Review of Hazard Evaluation
☐ Decon Procedures	☐ Work Zones	☐ Other (Specify):
☐ Emergency Procedures (include route to hospital)	☐ Lockout/Tagout	☐ Other (Specify):

Personnel Sign-in List

Printed Name	Signature	Company Name

Project Safety Briefing Form

Project Number:	**Project Name:**	
Date:	**Time:**	**Project Manager:**
Briefing Conducted by:		**Signature:**

This sign-in log documents the project specific-briefing conducted in accordance with the HASP and GEI H&S policy. GEI personnel who perform work on site are required to attend the Project briefing and to acknowledge it's receipt. Applicable health and safety SOPs are also required to be reviewed in this briefing and attached as an appendix to the HASP. Prior to the start of the project **or upon the start of a new on-site project team member**, this form must be completed. Please email this completed form to Health&SafetyCommittee@geiconsultants.com.

TOPICS COVERED (check all those covered):

☐	General PPE Usage	☐	Excavation Safety	☐	SOP:
☐	Hearing Conservation	☐	Confined Space	☐	SOP:
☐	Respiratory Protection	☐	Traffic Safety	☐	SOP:
☐	Personal Hygiene	☐	Changes to the HASP	☐	SOP:
☐	Exposure Guidelines	☐	Site Control	☐	SOP:
☐	Decon Procedures	☐	Work Zones	☐	SOP:
☐	Emergency Procedures (include route to hospital)	☐	Lockout/Tagout	☐	SOP:
		☐	Review of Hazard Evaluation	☐	SOP:
☐	Confined Space			☐	SOP:
☐	Slips, Trips, Falls	☐	Other (Specify):	☐	SOP:
☐	Heat Stress	☐	Other (Specify):	☐	SOP:
☐	Cold Stress	☐	Other (Specify):	☐	SOP:

Personnel Sign-in List

Printed Name	**Signature**

Please complete this form and send it to your Branch Manager, HR and CHSO ***within 24 hours*** of the incident.

GEI Consultants

Accident/Incident Report Form

SECTION A — ACCIDENT/INCIDENT DETAILS

EMPLOYEE INFORMATION:	OTHER INJURED (IF APPLICABLE):
Name: ______	**Name:** ______
Home Address: ______ Street Address City State Zip Code	**Home Address:** ______ Street Address City State Zip Code
Contact Information: ( ) ______ ( ) ______ Primary Secondary	**Contact Information:** ( ) ______ ( ) ______ Primary Secondary
Date of Birth: ______	**Date of Birth:** ______
Date of Hire: ______	**Date of Hire:** ______
Branch: ______	**Branch:** ______
Supervisor: ______	**Supervisor:** ______

Date and Time Accident/Incident	Date and Time Reported	LOCATION OF INCIDENT/ACCIDENT
____ /____ /____ Month Day Year ____ A.M. ____ P.M.	____ /____ /____ Month Day Year ____ A.M. ____ P.M.	**Project Name:** ______ **Client and Location:** ______ **or** ______ **Office Location:** ______

INCIDENT TYPE: (Check All That Applies)	WITNESS INFORMATION
☐ **Personal Injury/Illness** ☐ **Vehicle Accident** ☐ **Property Damage** ☐ **Environmental Spill** ☐ **Other**	**Name:** ______ **Contact Number:** ______ **Company:** ______

WHAT HAPPENED TO THE INJURED PARTY: ☐First Aid Administered ☐Refused Treatment/Transport ☐Transported to Hospital ☐Returned to Work ☐ Went Home ☐ Went to Physician ☐ Unknown

Clinic/Hospital or Treating Physician: ______ Phone: ______

Name Street Address City State Zip Code

SECTION B — PERSONAL INJURY

Cause of Injury: ______

Part of Body Injured: ______ Multiple Injuries: ☐Y ☐N

Was PPE worn when injured? : ☐Y ☐N What PPE was worn? ______

WAS INJURY A RESULT OF THE USE A MOTOR VEHICLE: ☐ **YES** ☐ **NO** **(If yes, complete Section C)**

Please complete this form and send it to your Branch Manager, HR and CHSO ***within 24 hours*** of the incident.

Accident/Incident Report Form

SECTION C AUTO ACCIDENT ONLY

DRIVER/VEHICLE INFORMATION

Name of Insured: ______________________

Department: ______________________

Driver's License Number: ______________________

DOB: ____/____/____ State: ______________________

Description of Vehicle: License Plate Number: ________

Make: ________ Model: ________ Year:_____ Color:________

Owner: ______________________

Name of Other Driver: ______________________

Driver's License Number: ______________________

State: ______________________

Description of Vehicle: License Plate Number: ________

Make: ________ Model:______ Year:_____ Color:________

Insurance Carrier: ______________________

Policy Number: ____________Ph. Number:____________

SECTION D PROPERTY DAMAGE OR CHEMICAL RELEASE ONLY

Type of Damage(s): ______________________

Cause of Damage(s): ______________________

Type of Chemical Released (if known): ______________________

Quantity of Chemical Released: ______________________

Spill Measures Employed: ______________________

SECTION E NATURE OF ACCIDENT/INCIDENT AND EXTENT OF INJURIES/DAMAGES

(Please give a detailed description of what happened. Attach a sketch or picture if applicable)

____

____

____

____

____

____

____

____

____

I hereby certify that the above information is true and correct to my understanding of this accident/incident.

______________________ ______________________

Employee/Preparer's Name **Date and Time**

NEAR MISS REPORT

A near miss is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee work habits, improper use of equipment, or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report and/or correct these potential accidents/incidents immediately. Please complete this form as a means to report these near-miss situations. Send a copy of the completed form to the Project Manager, Regional Health and Safety Officer and the Corporate Health and Safety Officer.

Location: _____ Site Name: _____

Date: _____ Time: _____ ☐ a.m. ☐ p.m.

Weather conditions, site operations taking place during near miss. _____

Please check all appropriate conditions:

☐ Unsafe Act ☐ Unsafe equipment

☐ Unsafe Condition ☐ Unsafe use of equipment

Description of incident or potential hazard: _____

Employees or sub-contractors involved if applicable._____

Employee Signature ______________________________ Date _____

Print Name _____

NEAR MISS INVESTGATION

Description of the near-miss condition: _____
Causes (primary & contributing) _____
Corrective action taken (Remove the hazard, replace, repair, or retrain in the proper procedures for the task) _____
Actions not yet taken_____

Signed: ________________________________ Date Completed: _____

Print Name
Not completed for the following reason: ______Date:______

GEI Consultants

Appendix E

GEI's Health and Safety SOPs

STANDARD OPERATING PROCEDURE

DM-006 Geoprobe® Direct Push Boring

1. Objective

Describe standard operating procedures (SOP) for drilling of overburden soil borings using Geoprobe® and MacroCore® technologies.

2. Execution

- Confirm that appropriate measures have been taken for clearance of potential subsurface utilities. The responsibility for clearance may vary, depending on the client.
- Inspect the drilling rig to make sure it is clean and that the down-hole equipment has been decontaminated (QA-001). Record condition of all down-hole drilling equipment.
- Make sure the sampler is fitted with a piston rod assembly to block the sample tube until the desired subsurface sample interval is attained. Upon reaching the target sample depth, the piston tip will be released and the discrete sampler device is then advanced to collect the representative sample. This reduces the volume of slough that is collected.
- When the sampler is brought to the ground surface, it should be opened immediately, and the length of recovery should be measured and recorded.
- Log the soil sample using USCS procedures (SOP SM-003). Collect analytical samples if necessary (SOP SM-001).
- Decontaminate the cutting shoe if necessary (SOP QA-001 Equipment Decontamination) and have driller reassemble the parts with a new liner.
- Repeat the procedure described above until refusal or the boring is terminated.
- Periodically verify that depths cited by drillers are accurate.

3. Limitations

- If significant unanticipated contamination is encountered during drilling, stop drilling to confer with the project manager and re-evaluate health and safety conditions.
- Arrange for the storage of contaminated soil cuttings and water in drums or other appropriate containers in a secure place at the site (see SOP SC-003, *Investigation Derived Waste Management*).
- If possible, plan the drilling program to drill borings from the least to most contaminated areas. Be prepared in advance and know where alternative drilling locations are in the event that problems are encountered at soil boring locations. These locations must also have been cleared by the state or local utility service prior to drilling.

4. References

ASTM D6001-05 Guide for Direct Push Water Sampling for Geoenvironmental Investigations, April 2005

Geoprobe Systems, "Geoprobe MacroCore MC-5 1.25-inch Light Weight Center Rod Soil Sample System SOP", Technical Bulletin No. MK 3139, November 2006

5. Attachments

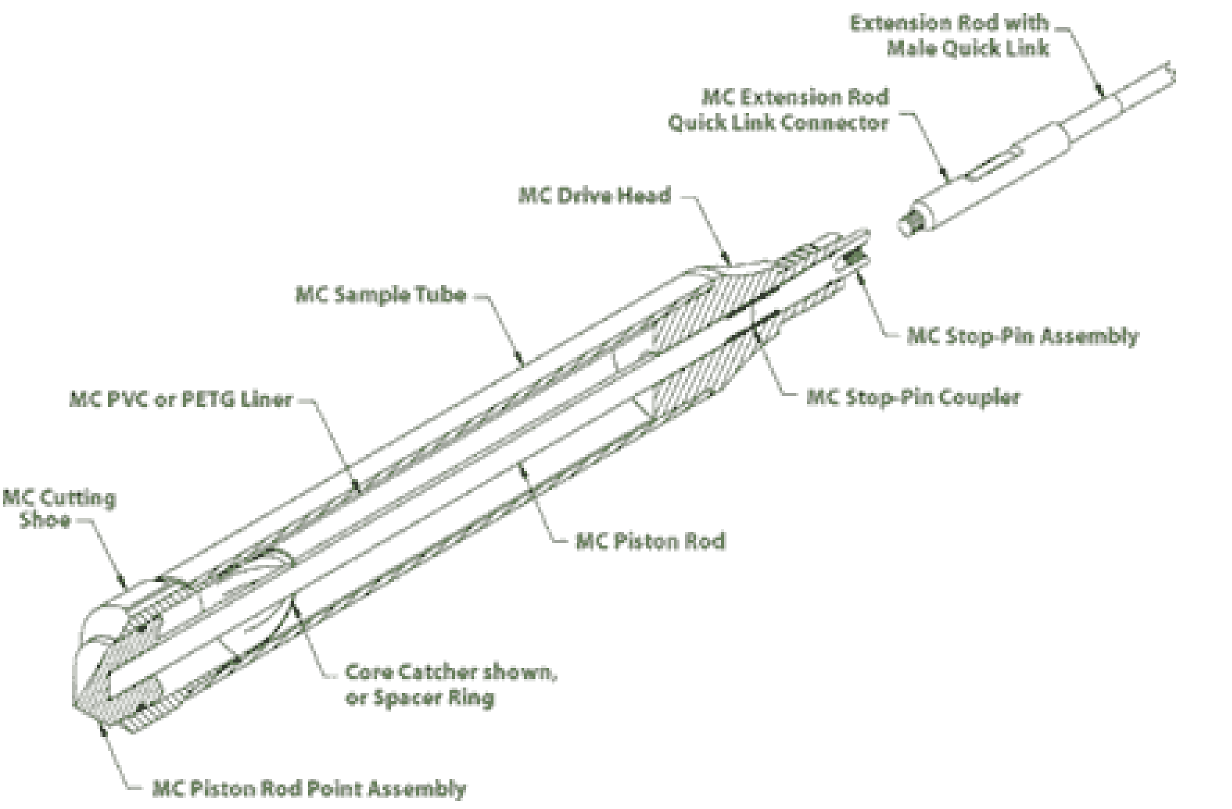
Attachment A – Geoprobe® with Macrocore® Sampler Assembly

6. Contact

Melissa Felter
Cathy Johnson

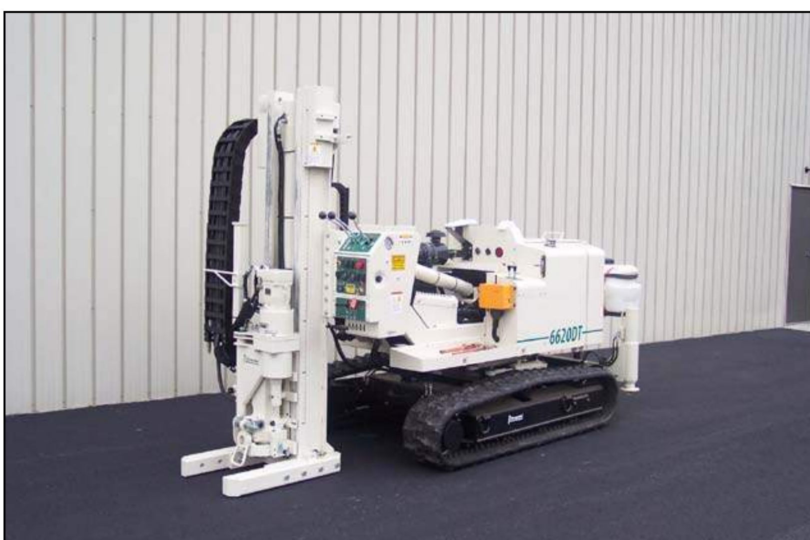
SOP DM-006

Attachment A – GeoProbe® with Macrocore® Sampler Assembly



Above: Diagram of a Macrocore® sampler

Right: A track-mounted GeoProbe ® Rig



GEI Consultants

STANDARD OPERATING PROCEDURE

GW-003 Low Flow (Low Stress) Groundwater Sampling

1. Objective

Describe methods to collect groundwater samples most likely to produce results that represent aquifer conditions.

Low-flow purging is limited to wells that, with sustained pumping, exhibit no continuous drawdown.

2. Execution

- Prior to groundwater sampling consult with the project manager to confirm that the type of pump is appropriate and consistent with the approved work plan.
- Record activities in the field notebook (see SOP FD-001 Field Notebook) and on a Monitoring Well Sampling Record such as the examples in Attachment A. Use a separate form for each sampling location and event. You may forego the forms and record all information in the field notebook if the Project Manager approves.
- Calibrate pH, temperature, Specific Conductance (SC), turbidity, Dissolved Oxygen (DO), and Oxidation-Reduction Potential (ORP) on the meter(s). Use calibration methods provided by the manufacturer of the equipment. Note that appropriate calibration for dissolved oxygen requires a water saturated air environment, along with measured temperature and barometric pressure.
- Begin with the monitoring well believed to have the least contaminated groundwater and proceed systematically to the well with the most contaminated groundwater. Check the well, the lock, and the locking cap for damage or evidence of tampering.
- Slowly and gently measure the depth to water with a water level probe and/or oil-water interface probe. Do not measure depth to well bottom at this time (wait until sampling has been completed). Measure water level in accordance with SOP GW-001 Water Level Measurement.
- Attach new polyethylene or Teflon lined tubing to the sampling pump and the flow-through cell that contains the meter probes.
- Slowly and gently insert new polyethylene or Teflon lined tubing to the pump intake (or use dedicated tubing that remains in the well) and to the middle of the saturated screened interval or to the pre-determined sampling depth.
- The tubing intake should be kept at least two (2) feet above the bottom of the well to prevent disturbance or suspension of any sediment or Non-Aqueous Phase Liquid (NAPL) present in the bottom of the well. Record the depth of the pump intake.

- If possible, position your sampling equipment and tubing so that it is in the shade. The goal is to minimize the effect of sunlight raising the temperature of water being collected.
- Start the pump on the lowest setting and increase slowly until flow begins. Adjust the pumping rate so that drawdown in the well is minimal (0.3 feet or less, is desirable but not mandatory). Use a pumping rate between 100 to 1,000 milliliters per minute (mL/min) (or approximately 0.1 to 1 quarts per minute). Measure flow rate on the pump or using a graduated container every 3 to 5 minutes and record. The minimum purge volume will be twice the combined volumes of the sampling string (i.e. pump, tubing, and flow-through cell).
- While purging, record water levels every 3 to 5 minutes and monitor and record the water quality indicator parameters: pH, temperature, specific conductance (SC), dissolved oxygen (DO), and turbidity. If specified in the field sampling plan also include ORP.
- Purging is complete when, after three consecutive measurements, the water quality parameters have stabilized as follows:

    - pH (+/- 0.1 standard units)
    - temperature (+/- 3%)
    - SC (+/- 3%)
    - turbidity (+/- 10% if >5 NTU; if 3 values are <5 NTU, consider the values as stabilized)
    - DO (+/-10% if >0.5 mg/L; if 3 values are <0.5 mg/L, consider the values as stabilized)
    - ORP (+/- 10 mV)

- Dispose of purge water according to the field plan.

Sample Collection:

- Following purge, remove the discharge tubing from the flow-through cell. Do not disturb pump and tubing between stabilization and sample collection.
- Fill sample containers directly from the sampling device in order of decreasing volatility (i.e., Volatile Organic Compounds (VOC) samples are collected first; see SOP SC-002 Sampling Handling). Fill all containers from the discharge end of the tubing. Collect samples at a flow rate equal to the steady state purge rate.
- If not using a dedicated pump, remove sampling device and decontaminate (see SOP QA-001 Equipment Decontamination). Discard used tubing.
- Store samples in a cooler on ice for transport to the laboratory.
- Measure depth to bottom of well.

- Secure the well cap.

3. Limitations

- Prior to departure for the field, obtain available information on well construction for use in field investigation (i.e., screen and riser material, well diameter and depth, screened interval, optimum sampling depth, etc.).
- If possible, when using dedicated equipment, install equipment into well at least 24 hours before sample collection to minimize disturbance of the water column and/or suspension of sediments or NAPL on bottom.
- If water quality indicator parameters do not stabilize after removing 3 to 5 well volumes or 2 hours, contact the Project Manager. Three options will be available: 1) continue purging until stabilization; 2) discontinue purging and do not sample; or 3) discontinue purging and sample.
- The key indicator parameter for VOCs is DO. The key indicator parameter for all other samples is turbidity.
- Fill all sample containers with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container.
- Consult with the project manager before field filtering samples for metals if using low-flow sampling.
- Be aware of any preservatives in the sample bottles and handle with care, in accordance with the Health and Safety Plan.

4. References

Standard Reference for Monitoring Wells (April 19, 1991), Massachusetts DEP, DEP Publication No. WSC-310-91.

Reproducible Well-Purging Procedures and VOC Stabilization Criteria for Ground Water Sampling (1994), M.J. Barcelona, H. A. Wehram, and M.D. Varljen, Ground Water, Vol. 32, No. 1, 12-22.

Low-Flow Purging and Sampling of Ground Water Monitoring Wells with Dedicated Systems (1995), R.W. Puls, and C.J. Paul, Groundwater Monitoring and Review, Summer 1995 116-123.

Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (2010), EQASOP-GW 001 Low Stress (Low Flow) SOP, Revision 3, U.S. Environmental Protection Agency, Region I, January 19, 2010.

Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling, (1998), Ground-Water Sampling SOP, Final, U.S. Environmental Protection Agency, Region II, March 16, 1998.

RCRA Ground-Water Monitoring: Draft Technical Guidance, (1993), U.S. Environmental Protection Agency, EPA/530-R-93-001.

To Filter, or Not to Filter, That is the Question, (1997), Special Topics Subcommittee Letter Report EPA-SAF-EEC-LTR-97-011, April 29, 1997, Meeting, U.S. Environmental Protection Agency, Science Advisory Board Environmental Engineering Committee, September 5, 1997.

Should Filtered or Unfiltered Groundwater and Surface Water Samples be Collected for the Risk Assessment?, (1995), MCP Q&A: Subparts I and J, Special #4, Bureau of Waste Site Cleanup, Massachusetts Department of Environmental Protection (DEP), February, 1995.

5. Attachments

Attachment A - Monitoring Well Sampling Record

6. Contacts

Brian Conte
Saskia Oosting

MONITORING WELL SAMPLING RECORD

PID Reading ____________________ Job Name ______________________________

Job Number ____________________ By ____________________ Date ____________

Location ____________________ Measurement Datum ______________________

Well Number ____________________

Pre-Development Information Time (start) ______________________

Water Level ____________________ Total Depth of Well ______________________

One Purge Vol ____________________ Three Well Volume ______________________

Water Characteristics

Color ____________________ ________ Clear _____ Cloudy

Odor _____ None _____ Weak ________ Moderate _____ Strong

Any films or immiscible material ______________________________

***Volume* (gal)**	**Time**	**pH**	**Temp (°C)**	**Spec. Conductance (µS/cm)**	**Turbidity (NTU)**	**DO Conc. (mg/L)**	**ORP (mV)**	**TDS**

Total Volume Removed (gal) ______________ pH ______________

Temperature (°C) ______________ Specific Conductance (µS/cm) ______________

DO Concentration (mg/L) ______________ ORP (mV) ______________

TDS ______________

Post Development Information Time (Finished) ____________

Water Level ____________ Total Depth of Well ____________

Approximate Volume Removed (gal) ______________________

Water Characteristics

Color ______________________ _____ Clear _____ Cloudy

Odor _____ None _____ Weak _____ Moderate _____ Strong

Any films or immiscible material ______________________________

Comments

Low-Flow Groundwater Sampling Form

Project number and name ______________________ Sampling personnel ______________________ Sample date ____________ Well ID ____________

Well location description: ____________

____

Well Construction

Well diameter ____________

Well measurement point ____________

Roadbox condition ____________

Well screen interval ____________

Well depth ____________

Sampling Information

Initial depth to water ____________ Time: ____________

Sample intake depth ____________

Pump type and ID ____________

Stabilized flow rate ____________

Stabilized flow rate = flow rate with no further drawdown

Samples Collected

VOCs 8260	
SVOCs 8270	
VPH	
EPH	
Metals	
PCBs	
Other	

Field values at time of sample collection:

Time: ____________ Depth to water: ____________

Sp.Cond. ____________ mS/cm

DO ____________ mg/L

ORP ____________ mV

pH ____________ s.u.

Temp. ____________ °C

Turb. ____________ NTU

Cumulative Time (min.)	**Volume (gal)**	**Water depth (ft)**	**Temp. (^{o}C)**	**Sp.Cond. (mS/cm)**	**D.O. (mg/L)**	**pH (s.u.)**	**ORP (mV)**	**Turb. (NTU)**
Typical Groundwater Values			5 to 15	0.05 to 5	0 to 4	5 to 7	-100 to +500	aim for <10

Notes: ______________________

Sample Information:

Sample ID ____________

Sample Time: ____________

Color: ____________

Turbidity: ____________

Field Filtered YES / NO Analyses: ____________

Filter type: ____________

Odor/Sheen/NAPL ____________

Duplicate Collected YES / NO

If yes, duplicate ID: ____________

Purge water disposal? to ground drummed other:

Well Volume Conversion:

Diam. (in)	Factor (gal/ft)
1	0.04
1.5	0.09
2	0.16
4	0.65
6	1.50

well volume =
3.14 x (r)^2 x 7.48 gal/ft
where r = 1/2 diameter in ft

Stabilization Criteria:
Sp.Cond. +/- 3%
DO +/- 10%
ORP +/- 10 mV
pH +/- 0.1 Std Units
Temp. +/- 3%
Turb. +/- 10% if values >1 NTU

Guidance:

1 Position tubing at midpoint of saturated screened interval

2 Minimize drop in water level and purge until parameters are stable

3 Disconnect flow thru cell during sampling

4 Call Project Manager if issues arise (e.g. stabilization takes more than 2 hrs, well goes dry, odd data).

5 For VPH and VOC samples, if stabilization flow rate is less than 200 ml/min, contact PM

STANDARD OPERATING PROCEDURES

SOP No. HS-011 Ladders – Fixed and Portable

1.1 Objective

GEI employees may be required to use ladders to access equipment or work areas as part of work activities. Ladders can be used on construction or manufacturing sites, and in office settings. GEI employees who have the potential for working on ladders will receive training on the use and hazards associated with ladders. The following guidelines must be followed when GEI employees use a fixed ladder or a portable ladder, such as an extension or stepladder.

1.2 General

This standard operating procedure (SOP) is intended for use by employees with the potential to use ladders. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies ladder usage by GEI employees. These hazards should be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Health and Safety page of the GEI intranet.

1.3 Ladder Selection

The selection of the ladder will be dependent on the intended use of the ladder. Factors to consider when selecting the proper ladder are:

- Expected working height.
- Expected load to be placed on the ladder.
- Conductivity of the ladder material.

1.4 Ladder Inspection

Ladders must be inspected before use by a competent person. Items to look for include:

- Must be OSHA and American National Standard Institute (ANSI) compliant.
- The weight placed on the ladder (person and equipment) must not exceed the ladder's specified load capacity noted on the ladder.
- Rungs, cleats, and steps must be parallel, level, and uniformly spaced when the ladder is in position for use, round rungs are prohibited.
- Ladders must be free of cracks, loose rungs, slivers, sharp edges, oil, grease, mud, and other slipping hazards.

- If a structural defect in the ladder is observed, the ladder must be immediately removed from service for repair or disposal.

1.5 Use of Ladders

- Ladders are to be used only for the purpose for which they were designed.
- Ladders will **not** be tied or fastened together to provide longer sections unless they are specifically designed for such use.
- Placement of a ladder **will** only be on a stable, level surface unless secured to prevent accidental displacement.
- Areas around the top and bottom of ladders **will** be kept clear of equipment and debris.
- Ladders used near exposed energized electrical equipment **will** have nonconductive side-rails.
- When climbing or descending on a ladder you must face the ladder, maintain three points of contact, and do not carry objects or use backpacks that may throw off your balance and cause you to fall.
- The top or top step of a ladder **will** **not** be used as a step or work surface.
- In the State of California the second to top step will also not be used.
- Do not lean away from a ladder; keep yourself centered.

1.6 Use of Portable Ladders

A portable ladder is one that can be readily moved or carried. The two common types of portable ladders are extension ladders and stepladders.

- When using an extension ladder, the base of the ladder must be placed at a working angle of one quarter of the working length of the ladder from the top support. For example: when using a 12-foot ladder, the base of the ladder must be three feet away from the structure.
- If an extension ladder is being used to access an upper landing surface, the ladder side rails must extend a minimum of 3 feet above the landing surface.
- If a stepladder is to be used, a metal spreader or locking device must be present and locked in place prior to use.
- The cross-bracing on the rear section of the stepladder will not be used for climbing unless the ladder is designed and steps are provided for climbing on both the front and rear sections.
- The top or top step of a stepladder will not be used as a step or work surface.
- Mark as “Damaged – Do Not Use”.

1.7 Limitations

Follow safety procedures as defined in the site-specific HASP.

1.8 References

OSHA 29 CFR 1926.1053 – Subpart X; *Stairways and Ladders*
OSHA Construction eTool - http://www.osha.gov/SLTC/etools/construction/falls/4ladders.html

1.9 Attachments

None

1.10 Contact

GEI Corporate Health & Safety Officer
GEI East – North Regional Health & Safety Officer
GEI East – South Regional Health & Safety Officer
GEI Central Regional Health & Safety Officer
GEI West Regional Region Health & Safety Officer

STANDARD OPERATING PROCEDURES

SOP No. HS-023 Scaffold

1.1 Objective

GEI employees may be required to use and work off of various types of scaffolding as part of work activities. GEI employees may also be required to observe the construction of scaffolding being used on project locations. This observation does not replace the scaffolding inspections that are required by OSHA as described in Section 1.9. The guidelines below cover work done with tubular welded frame scaffolding, power scaffolding, elevating platforms, forklift personnel lifts and telescoping scaffolding in order to provide GEI employees with a basic awareness of scaffolding systems.

1.2 Terminology

Cleats: Structural block used at the end of a platform to prevent the platform from slipping off its supports. Cleats are also used to provide footing on sloped surfaces.

Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate them.

Coupler: A device for locking together the tubes of a tube and coupler scaffold.

Elevating Platform: A platform that rises to any desired working height.

Guardrail System: A vertical barrier erected to prevent employees from falling off a scaffold platform or walkway to lower levels. Guardrail systems consist of top-rails, mid-rails, toe boards, and posts.

Independent Pole Scaffold: A supported scaffold consisting of a platform(s) resting on cross beams (bearers) supported by ledgers and a double row of uprights independent of support from any structure.

Mid-Rail: Horizontal rail installed halfway between the top guardrail and the working platform.

Mobile Scaffold: A powered or unpowered, portable, caster or wheel-mounted supported scaffold.

Mudsill: Platforms designed to distribute scaffold weight. The size of mud sills used is based on ground support conditions and maximum anticipated loads on the scaffold legs.

Live Load: The load to which a structure is subjected in addition to its own weight.

Outrigger: Structural member of a supported scaffold used to increase the base width of a scaffold in order to provide support for and increase stability of the scaffold.

Qualified Person: One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

Scaffold: Any temporary elevated platform and its supporting structure, used for supporting employees and/or materials.

Toe board: A vertical barrier installed at deck level along the sides and ends of a platform or scaffold.

Top-Rail: Horizontal rail installed at the top of a guardrail system.

Tubular Welded Frame Scaffold: A scaffold consisting of a platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

Tube and Coupler Scaffold: A scaffold consisting of a platform(s) supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.

1.3 General requirements for all scaffolds

- Scaffolds will be furnished and erected in accordance with the OSHA Subpart L Scaffolding standards for persons engaged in work that cannot be done safely from the ground or from solid construction.
- All scaffolds will be designed by a qualified person and will be constructed and loaded in accordance with that design.
- All scaffolding and elevating platforms, either leased or purchased, will have the manufacturer's safety instructions available for erection and use. Scaffolding and elevating platforms must be erected and used following the manufacturer's instructions. Scaffold components manufactured by different vendors will not be mixed.
- The footing or anchorage for scaffolds will be sound, rigid and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks will not be used to support scaffold planks.
- Scaffold poles, posts, legs and uprights must be plumb. Additionally, poles, posts, legs, and uprights will be securely and rigidly braced to prevent swaying and displacement.
- Scaffolding will be tied and securely braced to the building or structure at least every 30 feet in length and 25 feet in height.
- Scaffolds whose working platform is 10 feet or greater in height will have a guardrail, mid-rail, and toe board installed.
- Scaffolding having a width of less than 45" must have guardrails on all open sides and ends when the working platform height is 4 feet or greater.

- The front edge of the platform cannot be more than 14 inches from the face of the work unless the front edge is protected by a guardrail and/or personal fall arrest system. Scaffolds and their components will be capable of supporting without failure at least four times the maximum intended load. Each platform on all working levels of scaffolds will be fully planked or decked according to 29 CFR (Code of Federal Regulations) Part 1926.451(b).
- Scaffolds and other devices mentioned or described in this section will be maintained in safe condition. Scaffolds will not be altered or moved horizontally while they are in use or occupied.
- Head protection is required for workers on or around scaffolding when there is a danger of falling objects and head injury.
- Working on scaffolds or platforms during storms, high winds or when covered with snow or ice is prohibited.
- Scaffolds must not be erected, used , dismantled, altered or moved when the scaffold or any conductive material on them might come closer to power lines than: 10 feet for insulated lines and insulated lines of more than 300 volts. And 3 feet for insulated lines of less than 300 volts.
- A visual inspection will be conducted immediately when a scaffold or platform has been damaged or weakened by any cause. The structure will not be occupied until the inspection has been completed and all identified discrepancies corrected.
- Frames and accessories for scaffolds will be maintained in good repair. Every defect, unsafe condition, or noncompliance with the manufacturer's specifications or recommendations will be corrected immediately. Any broken, bent, rusted, altered, or otherwise structurally damaged item/section or accessory will not be used.
- Ladders or make shift devices will not be used to increase the height of a scaffold or platform.
- Scaffolds will not be loaded in excess of the working load for which they are designed.
- All load-carrying timber members of scaffold framing will be a minimum of 1,500 f. (Stress Grade) construction grade lumber.
- All planking will be Scaffold Grade as recognized by grading rules for the species of wood used.
- Wood planking will extend over end supports at least 6" and a maximum of 12". Additionally, planking will be cleated to prevent movement.
- Tools and parts will not be carried in hands or pockets when ascending or descending access ladders. Tool belts, tool buckets and ropes, or other acceptable means will be used to raise and lower such items.
- Slippery conditions on scaffolds and platforms will be eliminated as soon as they occur.
- Cross braces, runners, and bearers will not be used for climbing. Access to scaffolds will be by stairs and ladders only.
- All scaffold casters will have a positive wheel and/or swivel lock to prevent movement.

- When leveling of the scaffold is required, screw jacks or other suitable means of adjusting the height must be provided in the base section of each scaffold. Maximum adjustment is 12inches. All sections of scaffolding will be locked together vertically by pins or other equivalent means.
- Each employee on a scaffold greater than 10 feet from a lower level must be protected from falling.

1.4 Tubular Welded Frame Scaffolds (Fabricated Frame Scaffolds)

- The assembly, erection, operations, use and maintenance of tubular welded frame scaffolds will meet manufacturer's requirements and recommendations.
- Mudsills will be placed under each leg. A continuous mudsill (which is under both legs of a side) that is 2" x 10" x 78" (minimum) is recommended. The minimum mudsill that will be used is 2" x 10" x 18" under each leg. Each leg base will be secured to the mudsill.
- Adjustable screw base panels will be used on each scaffold leg. The minimum height of adjustable is12" to the top of the adjustment screw.
- Spacing of the panels or frames will be consistent throughout the scaffold being assembled.
- Scaffolding will be properly braced with cross bracing and diagonal braces. Cross braces will be of such length as to automatically square and align vertical members so the erected scaffold is always plumb, square, and rigid. All brace connections will be made secure and checked for proper engagement of the locks.
- The frames will be placed on top of the other with coupling or stacking pins to provide proper vertical alignment of the legs.

1.5 Elevating Platforms

- Operators will complete an operational inspection prior to each use.
- The live load must not exceed manufacturer's recommended capacities.
- Outriggers will always be fully extended and in firm contact with the supporting surface.
- The platform will be operated following the manufacturer's instructions.

1.6 Aerial Lifts

- See GEI H&S SOP HS-020 Aerial Lifts for guidance.

1.7 Telescoping Scaffold

- The scaffold will be thoroughly inspected prior to each use.

- Outriggers will be fully extended prior to use. When the outriggers on the inside of the scaffold cannot be deployed, the scaffold will be secured and braced to the structure if the top deck is raised.
- Once the desired height is obtained, a safety pin will be placed in each leg of the scaffold. Height adjustment is in 6 inch increments.
- Guardrails will be used at all times with this scaffolding.

1.8 Inspections

All scaffolds and their components will be thoroughly inspected by a competent person before each erection to ensure the soundness of the scaffold. GEI employees may not act as the competent person. At a minimum:

- The competent person should supervise the erection, modification, and disassembly of scaffolds.
- A visual inspection will be made of all tubular components. All foreign objects on the inside of the tubular part will be removed. If the object cannot be moved, the part will not be used.
- The exterior and interior of all legs, runners, braces, and bearers will be inspected for corrosion. All corrosion found will be corrected. A professional engineer will verify that the part which contained the corrosion meets the design criteria after the corrosion has been removed. Components with corrosion will not be used since their strength is unknown.
- Before scaffold is erected, the surface of the proposed location will be inspected for stability, level, potential obstructions, and electrical hazards.
- Erected scaffolds will be visually inspected before each day’s use and/or each work shift to insure a safe condition is maintained. All inspections will be documented.
- Unsafe equipment or conditions must be tagged out by a Competent Person, and must be complied with. When tags are used to document inspections by the Competent Person GEI employees will comply with the requirements of the tagging system. Scaffolds that have been tagged as unsafe by the Competent Person will not be used by GEI employees.

1.9 References

OSHA 29 CFR 1926.451 – Subpart L; Scaffolds
OSHA Scaffolding eTool - http://www.osha.gov/SLTC/etools/scaffolding/index.html

1.10 Contact

GEI Corporate Health and Safety Officer
GEI East – North Regional Health and Safety Officer

GEI East - South Regional Health and Safety Officer
GEI Central Regional Health and Safety Officer
GEI West Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURE

SG-001 General Guidance on Soil Vapor Intrusion Evaluations

1. Objective

The goal of a soil vapor intrusion evaluation is to assess whether complete exposure pathways of soil vapor to indoor air exist. A complete exposure pathway exists if vapors from constituents are migrating through various pathways into residential or commercial buildings at concentrations that may result in an unacceptable human health risk. If a complete exposure pathway does not exist, then further assessment of soil vapor intrusion is not required.

Depending on the status of investigation performed at the site it may be appropriate to approach an evaluation of soil vapor intrusion at different tiers. If little work has been performed relative to the potential for contaminants to affect soil vapor near a structure, then a screening level assessment is an appropriate first step. However, if a plume is well delineated and the potential for groundwater impacts, or nearby source material, to affect soil vapor near a potential receptor structure is well understood, then it may be more appropriate to directly develop and implement a soil vapor and/or indoor air sampling plan. To accommodate the potential varied states of knowledge when a vapor intrusion evaluation is required, a flexible approach is needed that incorporates the following elements.

- SOP SG-002 Soil Vapor Sample Collection
- SOP SG-003 Sub-Slab Soil Vapor Collection
- Indoor Air Sampling
- SOP SG-004 Ambient Air Sample Collection

Soil vapor intrusion evaluations should be approached on a site-specific basis and depending on the site-specific setting and proximity to impacted groundwater or source material, it may be appropriate to proceed in a hierarchical fashion through each tier of evaluation or a variety of tiers may be combined and implemented simultaneously. The SOPs presented in this SOP address each of these sampling procedures.

2. Execution

2.1. Implementation Triggers

Soil vapor intrusion evaluations may be implemented at various times based on event triggers throughout the Site Characterization (SC), Remedial Investigation (RI), and site remedial action plan. The following event triggers would require the implementation of this soil vapor intrusion investigation.

- Identification of a potential complete exposure pathway
- Private property owner request for sampling

- State or Federal administrative order

2.2. Factors Affecting Soil Vapor Intrusion

Prior to conducting a soil vapor intrusion assessment at a private property, an analysis of the factors contributing to the migration of soil vapor to indoor air should be conducted. The completion of this analysis should take into account the two types of factors: environmental and building factors.

2.2.1. Environmental Factors

Environmental factors include site specific conditions in the subsurface and above the ground surface that may affect the rate and direction at which soil vapor may migrate.

The soil and groundwater conditions between the contamination and the residential/commercial building should be evaluated and recorded in any soil vapor intrusion investigation. If the SC/RI has been completed, then the data are available for this review. If the SC/RI has not been completed, then at a minimum the nature and extent of impacted soil and/or groundwater between the site and the residential/commercial building should be defined.

After compiling the necessary site-specific data, that information should be reviewed to determine groundwater conditions at the site. The potential for man-made or natural preferential pathways for vapor migration in the vadose zone and/or for groundwater migration in the saturated zone should also be determined at this time.

- The depth to groundwater below the residential or commercial building will be determined. For example, in cases where groundwater intersects the foundation there is no vadose zone to collect a sub-slab sample. In cases where the groundwater is close to the foundation, there is a risk of causing/exacerbating groundwater intrusion through the foundation during periods of high groundwater.

Additional Site Observations

- Direction of groundwater flow from the contaminant source to the residential or commercial building;
- The location, depth, extent, and concentration of potential constituents in unsaturated soil and groundwater on the property; and,
- Presence of an overlying water bearing zone that does not have impacts beneath the residential or commercial building. An un-impacted shallow water zone will significantly retard or completely prohibit the potential for deeper impacted groundwater to affect soil vapor.
- Potential “smear zones” (residual non-aqueous phase liquid (NAPL) present at depths over which the water table fluctuates) should also be identified as they may also affect the rate of soil vapor migration.
- Location, depth, extent of NAPL, if present.

Soils which are highly organic, wet, and/or of low permeability should be identified. If these soils are present beneath a structure and above impacted groundwater or soil, they may effectively shield the building from potential vapor intrusion. Conversely, dry and porous soils underlying a building may provide a less inhibited soil vapor intrusion pathway. The limits of backfill surrounding residential or commercial building should be also noted.

2.2.2. Building Factors

Building Factors include the physical characteristics, such as structure, floor layout, air flow, and physical conditions. These conditions will be documented during the evaluation. The New York State Department of Health (NYSDOH) Center for Environmental Health's Indoor Air Quality Questionnaire and Building Inventory form is presented in Attachment A. At a minimum, the following information should be recorded.

- Building foundation construction characteristics (basement, footers, crawl spaces, etc), including potential preferential vapor intrusion pathways such as foundations cracks and utility penetrations.
- Basement wall materials (hollow block, stone, or poured concrete, etc.)
- Presence of an attached garage.
- Recent renovations to the building such as new paint or new carpet.
- Mechanical heating/cooling equipment that may affect air flow.
- Use and storage of petroleum products such as home heating oil storage tanks, underground storage tanks (USTs), or kerosene heaters.
- Recent use of petroleum-based finish or other products containing volatile organic compounds (VOCs).
- Areas of pavement on the property should also be identified in the event sub slab vapor sampling is not feasible or appropriate due to a high groundwater table. Paved areas could serve as surrogate locations in lieu of sub slab soil vapor sampling if high water table conditions exist.

The construction materials and integrity of the floor of the structure closest to the potential point of entry for soil vapor (basement level or first floor for slab-on-grade constructions) should be identified. In addition to the foundation type and integrity, this survey should note any preferential pathways (utility lines/pipes, sumps, etc.) that may exist within the bottom-most level of the structure.

The operation and presence of heating systems, including fireplaces and clothes dryers, may create a pressure differential between the structure and the outside environment, causing an increase of migration of soil vapor into the building. The NYSDOH guidance document suggests limiting indoor air sampling to the heating season (with the exception of immediate inhalation hazard situations), which is roughly defined as November 15th to March 31st. However, sampling may be completed at any time during the year for any sampling completed in response to a request by a community member. In situations where non-heating season sampling has taken place, consideration should be given to re-sampling the property within the heating season. The operation of HVAC systems should be noted on the building inventory form (Attachment A).

During the initial building assessment and visit, and again when sub-slab soil vapor and/or indoor air sampling are performed, differential pressure measurements between indoor air, ambient air, and soil vapor should be collected and recorded to document the potential effect building conditions have on soil vapor migration.

2.2.3. Property Visit

A property visit will be conducted prior to sampling. During the site visit, technical representatives will complete site visit observations, inventories and occupant questionnaire forms (Appendix A). During the course of the interview, observations will be made to identify any potential areas or issues of concern or the presence of any odors, and if sampling appears necessary, identify potential sampling points and general building characteristics. The questionnaire is also used to identify potential sources and activities that may interfere with sampling results. The questionnaire will specifically address the activities of the occupant's (e.g., smoking, work place activities) that may contribute to indoor air concentrations of volatile chemicals.

The responses to the questionnaire will be evaluated and a determination will be made as to whether additional investigation is required.

2.2.4. Chemical Inventory

The chemical inventory complements the identification of the building factors affecting soil vapor intrusion. The chemical inventory will identify the occurrence and use of chemicals and products throughout the building. These products can be used to develop an indoor environmental profile. A separate inventory should be prepared for each room on the floor being tested as well as any other indoor areas physically connected to the areas being tested. Inventories will include product names, chemical ingredients, or both. If possible, photographs of the products should be taken of the location and condition of the inventoried products and the photographic records should be indexed with the inventory records. The products inventory can also be used to document odors and if possible portable vapor monitoring equipment measurements should be taken and recorded. A product inventory will be repeated prior to each round of testing at the building. If available, the volatile ingredients should be recorded for each product. If the ingredients are not listed on the label, record the manufacturer's name and address or phone number if available. The product inventory form is presented in Attachment A.

2.2.5. Water Table Conditions and Vapor Intrusion Assessment Approach

Sub-slab soil vapor sampling is intended to evaluate the potential for vapor intrusion. However, there are circumstances where collection of sub-slab soil vapor samples may not be feasible if the water table is near, at, or above the elevation of a buildings foundation slab. An evaluation of the water table elevation relative to the building slab should be made before attempting to install a sub-slab vapor sampling point.

If the water table is found to be sufficiently below the building slab and sub-slab vapor sampling can be performed, then the following Low Water Table Scenario should be followed.

2.2.5.1. Low Water Table Scenario

If the water table elevation is lower than the basement slab, then the following samples should be collected.

- Sub-slab soil vapor samples
- Indoor air samples from basement level
- Indoor air samples from main living space (First floor)
- Outdoor ambient air sample

If the water table is deemed to be at too high of an elevation to allow sub-slab vapor sampling, then alternate means of evaluating the potential for vapor intrusion must be employed. If a building has a groundwater sump, the sump should be evaluated to determine if there is water present in the sump and if that water is representative of groundwater or if the water is stagnant. If water in the sump represents groundwater, then a sample from the sump should be collected. The High Water Scenario below summarizes the methods to evaluate potential vapor intrusion if sub-slab vapor sampling cannot be conducted due to high groundwater conditions.

2.2.5.2. High Water Table Scenario

If the water table elevation is higher than the basement slab, then the following tasks should be performed.

- Determine if a sump pump is present and actively pumping water.
- If sump is actively pumping, collect a sample of groundwater from the sump.
- Collect an indoor air sample from basement level.
- Collect an indoor air sample from main living space (first floor).
- Identify exterior soil vapor sample location near foundation (outside of foundation backfill) and preferably beneath a surrogate vapor cap (e.g. paved driveway, patio).
- Collect soil vapor samples from exterior soil vapor location
- Collect an outdoor ambient air sample.

3. References

USEPA modified Method TO-15 and helium via ASTM D-1945.

Section 2.7.1 of the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006.*

4. Attachments

Attachment A - NYSDOH Center for Environmental Health's Indoor Air Quality Questionnaire and Building Inventory Form

5. Contact

Chris Berotti

ATTACHMENT A

Off-Site Property Sampling Documentation Form

Property Location/Address: ______________________________

Property: _____________________________

Sampling Date: _____________________________

Property Location/Address: ______________________________
Property: ____________________________
Sampling Date: ____________________________

Preparer's Name: ________________________________ Date/Time Prepared: ______________

Preparer's Affiliation: ________________________________ Phone No.: __________________

Purpose of Investigation:____

1. OCCUPANT Interviewed: Yes ☐ No ☐

Last Name: _____________________________ First Name: ____________________________

Address: ____

County: _______________________

Home Phone: ___________________________ Office Phone: __________________________

Number of Occupants/persons at this location _______ Age of Occupants__________________

2. OWNER OR LANDLORD (Check if same as occupant __) Interviewed: Yes ☐ No ☐

Last Name: _____________________________ First Name: ____________________________

Address: ____

County: _______________________

Home Phone: ___________________________ Office Phone: __________________________

3. CONTACT NAME (Check if same as Occupant ____, Owner ____)

Last Name: _____________________________ First Name: ____________________________

Address: ____

County: _______________________

Home Phone: ___________________________ Office Phone: __________________________

4. PROPERTY LOCATION: ____

Relative to Site:

Direction _________ Direction to Nearest Cross Street: __________

Distance _________ Distance to Nearest Cross Street: __________

Surrounding Land Use:

North: _________________ East: _________________

South: _________________ West: _________________

Property Location/Address: ____________________________
Property: ___________________________
Sampling Date: ___________________________

5. PROPERTY BOUNDARIES

Delineate the boundaries of the property (on a separate project map, outline property location, private well location, septic/leachfield location, groundwater flow, compass direction, windrose.)

6. BUILDING CONSTRUCTION

Type of Building (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _________________

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) _____________________________________

Does it include residences (i.e., multi-use)? Yes □ No □

If yes, how many? ______

Other characteristics:

Number of floors______ Building age______

Is the building insulated? Yes □ No □ How air tight? Tight / Average / Not Tight

Construction Material ___________________________________

7. BASEMENT AND CONSTRUCTION CHARACTERISTICS

Does the building have a basement and/or crawl space, or is it slab-on-grade construction?

____

Describe the construction of the basement/crawl space (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other ________

Property Location/Address: ______________________________
Property: _____________________________
Sampling Date: _____________________________

c. Basement floor:	concrete	dirt	stone	other ________
d. Basement floor surface:	uncovered	covered	covered with ____________	
e. Concrete floor:	unsealed	sealed	sealed with _____________	
	unpainted	painted	painted with ____________	
f. Foundation walls:	poured	block	stone	other ________
g. Foundation walls:	unsealed	sealed	sealed with _____________	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	

Does your basement have a sump? Yes ☐ No ☐

Is, is there water in the sump? Yes ☐ No ☐

Describe sump conditions:____

____

Have you observed standing water in your basement? Yes ☐ No ☐

If so, what is the frequency of this observation? _____________During rain events? ☐

Have you observed sheen atop the standing water? Yes ☐ No ☐

Basement/Lowest level depth below grade: ________(feet)

Are there any cracks in the floor of your basement? Yes ☐ No ☐

Description: ____

____

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

Description: ____

____

What activities occur in the finished basement?

Description: ____

____

Approximately how many hours per day (or week) do you spend in your basement? __________

8. HEATING, VENTING AND AIR CONDITIONING

Type of heating system(s) used in building: (Circle all that apply – note primary)

Property Location/Address: ______________________________
Property: _____________________________
Sampling Date: _____________________________

Hot Air Circulation	Hot Water Baseboard	Steam Radiation
Electric Baseboard	Heat Pump	Wood Stove
Space Heaters	Radiant Floor	Outdoor wood boiler
Unvented Kerosene Heater	Other _____________________________	

The primary type of fuel used is:

Fuel Oil	Natural Gas	Electric
Kerosene	Propane	Solar
Wood	Coal	Other? ___________________

Time of use of each type of heating? ____

Domestic hot water tank fueled by: ____

Boiler/furnace located in: Basement Outdoors Main Floor Other________________

Air conditioning: Central Air Window units Open Windows None

Are there air distribution ducts present? Yes ☐ No ☐

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

____

____

____

____

Type of insulation (e.g. blown, fiber, etc.)? ____

Does building have energy efficient windows (e.g. double paned) Yes ☐ No ☐

Was weather-stripping recently added/upgraded? Yes ☐ No ☐

Particleboard used in construction? Yes ☐ No ☐

9. OCCUPANCY

Property Location/Address: ______________________________
Property: ______________________________
Sampling Date: ______________________________

Level General Use of Each Floor (e.g., family room, bedroom, laundry, workshop, storage)

Basement ____

1st Floor ____

2nd Floor ____

3rd Floor ____

4th Floor ____

10. BULK PETROLEUM STORAGE

Aboveground storage tank on the property Yes □ No □

If yes, how old is tank? ________________ Condition? ___________________

Last inspected? ________________ Location: _____________________

Describe conduits to building (type, location, and entry portal condition): __________________

____

Underground storage tank on the property. Yes □ No □

If yes, how old is tank? ________________ Condition? ___________________

Last inspected? ________________ Location: _____________________

Describe conduits to building (type, location, and entry portal condition): __________________

____

11. WATER AND SEWAGE

Water Supply:

Public Water Drilled Well Driven Well Dug Well Other _______________

Is there use of groundwater water for irrigation purposes? Yes □ No □

Sewage Disposal:

Public Sewer Septic Tank Leach Field Dry Well Other _______________

12. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Yes □ No □

If not, is there a separate garage or carport? Yes □ No □

b. Does the garage have a separate heating unit? Yes □ No □ NA □

Property Location/Address: ______________________________
Property: _____________________________
Sampling Date: _____________________________

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, ATV, car)

Yes ☐ No ☐ NA ☐ Please specify__________________

Is gasoline stored in the garage? Yes ☐ No ☐

Quantity? ________________

d. Has the building ever had a fire? Yes ☐ No ☐

When?_________________

e. Is a kerosene or unvented gas space heater present? Yes ☐ No ☐

Where? ________________

f. Is there a workshop or hobby/craft area? Yes ☐ No ☐

Where & Type? ________________

g. Is there smoking in the building? Yes ☐ No ☐

How frequently? _______________

h. Have cleaning products been used recently? Yes ☐ No ☐

When & Type? ________________

i. Have cosmetic products been used recently? Yes ☐ No ☐

When & Type? ________________

j. Has painting/staining been done in the last 6 months? Yes ☐ No ☐

Where & When? _______________

Is house paint stored inside? Yes ☐ No ☐

Where? _______________

k. Is there new carpet, drapes or other textiles? Yes ☐ No ☐

Where & When? _______________

l. Have air fresheners been used recently? Yes ☐ No ☐

When & Type? ________________

m. Is there a kitchen exhaust fan? Yes ☐ No ☐

If yes, where vented?____________

n. Is there a bathroom exhaust fan? Yes ☐ No ☐

If yes, where vented?____________

o. Is there a clothes dryer? Yes ☐ No ☐

If yes, is it vented outside? Yes ☐ No ☐

p. Has there been a pesticide/chemical fertilizer application? Yes ☐ No ☐

Property Location/Address: ______________________________
Property: _____________________________
Sampling Date: _____________________________

When & Type?____

Conducted by Owner or Private Yard Service ___________________________

Is yard waste/trash burned on-site? Yes ☐ No ☐

Do any of the building occupants use solvents at work? Yes ☐ No ☐

(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? ____

If yes, are their clothes washed at work? Yes ☐ No ☐

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, Use dry-cleaning regularly (weekly) No

Use dry-cleaning infrequently (monthly or less) Unknown

Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Yes ☐ No ☐

Date of Installation: ____________

Is the system active or passive? Active ☐ Passive ☐

Are there any recent/past improvements to building? Yes ☐ No ☐

Interior painting? ____

Any landscaping improvements that involved bringing fill on site? Yes ☐ No ☐

Other ____

Approximately when (how long ago) did these improvements occur? ______________

Does anyone living here engage in any of the following activities or hobbies?

a. Art projects (e.g. oil painting, ceramics, pottery, stained glass, metal sculpture)

Yes ☐ No ☐

Name: ____________________________ Age: _________ Sex: _____________

Name: ____________________________ Age: _________ Sex: _____________

Property Location/Address: ______________________________
Property: ____________________________
Sampling Date: ____________________________

b. Furniture refinishing Yes ☐ No ☐

Name: ______________________________ Age: _________ Sex: ______________

Name: ______________________________ Age: _________ Sex: ______________

c. Model building(e.g. planes,boats,cars) Yes ☐ No ☐

Name: ______________________________ Age: _________ Sex: ______________

Name: ______________________________ Age: _________ Sex: ______________

d. Gardening Yes ☐ No ☐

Name: ______________________________ Age: _________ Sex: ______________

Name: ______________________________ Age: _________ Sex: ______________

e. Automotive work Yes ☐ No ☐

Name: ______________________________ Age: _________ Sex: ______________

Name: ______________________________ Age: _________ Sex: ______________

f. Ammunition reloading Yes ☐ No ☐

Name: ______________________________ Age: _________ Sex: ______________

Name: ______________________________ Age: _________ Sex: ______________

Is there a wood burning stove? Yes ☐ No ☐

If so, how frequently is it used?

____

____

Is there a barbeque grill? Yes ☐ No ☐

If so, how frequently is it used? What is the type of fuel?

____

____

Has the building ever had fumigation? Yes ☐ No ☐

If so, when and how frequently? Type?

____

____

13. ODOR SUMMARY

Have the occupants observed any unusual odors? ______________________________________

____

____

____

____

History of odor observation – date of onset, duration, severity, etc.

____

____

____

____

____

____

____

14. PRODUCT INVENTORY

Record the specific products found in building that have the potential to affect indoor air quality on the attached product inventory form.

15. INDOOR SKETCH

Draw a plan view sketch (on grid paper) of the basement, first floor, and any other floor where sampling was conducted in the building as well as any outdoor sample locations. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Property Location/Address: ______________________________
Property: ______________________________
Sampling Date: ______________________________

Product Inventory
Off-Site Property Sampling Documentation
Soil Vapor Intrusion Investigation

Property Address:	**Performed by:**
Date of Inventory:	**Field Instrument Make & Model:**

Location	**Product Description**	**Size (units)**	**Condition ***	**Chemical Ingredients**	**Field Instrument Reading (units)**	**Photo ** Y/N**

Notes

* Describe the condition of the product containers as Unopened (UO), Used (U), or Deteriorated (D)

** Photographs of the front and back of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

STANDARD OPERATING PROCEDURE

SG-002 Soil Vapor Sample Collection

1. Objective

This procedure outlines the general steps to collect soil vapor samples. The site-specific Sampling and Analysis Work Plan should be consulted for proposed sample locations, sample depths, and sampling duration.

2. Execution

Permanent and temporary soil vapor probes should be installed using the procedures outlined below. All soil vapor probes should be installed using a direct-push drill rig (e.g., Geoprobe® or similar), hand auger, or manually using a slide hammer.

2.1. Document Field Conditions

Document pertinent field conditions prior to installation of any probe points.

- Record weather information (precipitation, temperature, barometric pressure, relative humidity, wind speed, and wind direction) at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport). Data should be obtained for the past 24 to 48 hours.
- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified.
- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (North);
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

2.2. Soil Vapor Point Installation Specifications

Each soil vapor point should be constructed as follows:

- Six-inch stainless steel Geoprobe® AT86 series Permanent Implants (soil vapor screens) or equivalent and threaded to an (expendable) stainless steel anchor point.
- The implants should be fitted with inert Teflon or stainless steel tubing of laboratory or food grade quality.
- The annular space surrounding the vapor screen interval and a minimum of 6-inches above the top of the screen should be filled with a porous backfill

material (e.g., glass beads or coarse silica sand) to create a sampling zone 1 foot in length.

For temporary points, a hydrated bentonite surface seal should be created at the surface to minimize infiltration. For permanent points, the additional measures described below should be included.

- The soil vapor points should be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet (or to grade, whichever is smaller) to prevent ambient air infiltration.
- If needed, the remainder of the borehole should be backfilled with clean material.
- A protective casing should be set around the top of the point tubing and grouted in place to the top of the bentonite to minimize infiltration of water or ambient air, as well as to prevent accidental damage to the soil vapor point.
- The tubing top should be fitted with a Swagelok® and cap to prevent moisture and foreign material from infiltrating the tubing.

2.3. Soil Vapor Sample Collection

Soil vapor samples should be collected as indicated in the work plan and in accordance with applicable state or federal guidance documents. Specifically, samples from the points should be collected as follows:

- Permanent soil vapor points should not be sampled or purged for a minimum of 24 hours after installation. Temporary points may be purged and sampled immediately following installation.
- Document pertinent field conditions prior to sampling as described above.
- A suction pump should be used to remove a minimum of three implant volumes from the soil vapor points prior to sampling. Include the volume of any additional tubing added to affix sampling equipment and the annular space between the probe and the native material if sand or glass beads were used.
- The purge rate shall not exceed 0.2 liters per minute.
- Samples should be collected for volatile organic compounds (VOCs) in an individually laboratory certified clean 1-liter SUMMA® canister (or equivalent) using a certified flow controller calibrated for the anticipated sample duration (4 minutes). The regulator flow rate should not exceed 0.2 liters per minute.
- A helium tracer gas should be used to identify any potential migration or short circuiting of ambient air during sampling as described below.
- Remove the protective brass plug from the canister. Connect the pre-calibrated flow controller to the canister.
- Record the identification numbers for the canister and flow controller.
- Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing

laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.

- Connect the tubing from the soil vapor probe to the flow controller.
- Open the valve on the canister. Record the time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.
- Photograph the canister and the area surrounding the canister.
- Monitor the vacuum pressure in the canister routinely during sampling.
- Stop sample collection when the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample should be rejected and collected again in a new canister.
- Record the final vacuum pressure and close the canister valve. Record the date and time that sample collection was stopped.
- Remove the flow controller from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Samples should be analyzed for VOCs and naphthalene via modified USEPA modified Method TO-15 and helium via ASTM D-1945.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. Maintain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory as soon as practical.
- All laboratory analytical data should be validated by a data validation professional in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, January 2005 and the USEPA Region II Standard Operating Procedure (SOP) for the Validation of Organic Data modified to accommodate the USEPA Method TO-15 and natural gas analysis by ASTM D-1945.

2.4. Tracer Gas Evaluation

The tracer gas evaluation provides a means to evaluate the integrity of the soil vapor probe seal and assess the potential for introduction of ambient air into the soil vapor sample.

A tracer gas evaluation should be conducted on the each temporary soil vapor probe to be sampled in a sampling event. A tracer gas evaluation should be conducted on the each permanent soil vapor probe during the initial sampling event and a minimum of 10% of the soil vapor probes during subsequent sampling events.

The following tracer gas evaluation procedure uses helium as a tracer gases which can be measured through laboratory analysis or by a portable detector.

Retain the tracer gas around the sample probe by filling an air-tight chamber (such as a plastic bucket) positioned over the sample location.

- Make sure the chamber is suitably sealed to the ground surface.
- Introduce the tracer gas into the chamber. The chamber should have tubing at the top of the chamber to introduce the tracer gas into the chamber and a valved fitting at the bottom to let the ambient air out while introducing tracer gas. Close the valve after the chamber has been enriched with tracer gas at concentrations >10%.
- The chamber should have a gas-tight fitting or sealable penetration to allow the soil vapor sample probe tubing to pass through and exit the chamber.
- After the chamber has been filled with tracer gas, attach the sample probe tubing to a pump that should be pre-calibrated to extract soil vapor at a rate of no more than 0.2 liters per minute. Purge the tubing using the pump. Calculate the volume of air in the tubing and probe and purge one to three tubing/probe volumes prior collecting an analytical sample or using a portable device to measuring the tracer gas concentration.
- Samples collected from vapor points during a tracer gas evaluation should be analyzed for VOCs and naphthalene via modified USEPA modified Method TO-15 and helium via ASTM D-1945.
- Alternately, a tracer gas detector may be used to verify the presence of the tracer gas in the chamber by affixing it to the valve fitting at the bottom of the chamber. The tracer gas detector may also be used to measure the tracer gas concentration in the pump exhaust during purging. If used, then record the tracer gas concentrations in the chamber and in the soil vapor sample.
- Based on the concentrations of the tracer gas detected during analysis or direct measurement, determine whether additional gas tracer evaluations are necessary.

If the evaluation on a probe indicates a high concentration of tracer gas in the sample (>10% of the concentration of the tracer gas in the chamber), then the surface seal is not sufficient and requires improvement via repair or replacement prior to commencement subsequent sample collection.

A non-detectable level of tracer gas is preferred, however, if the evaluation on a probe indicates a low potential for introduction of ambient air into the sample (<10% of the concentration of the tracer gas in the chamber), then proceed with the soil vapor sampling. While lower concentrations of tracer gas are acceptable, the impact of the detectable leak on sample results should be evaluated in the sampling report.

3. References

USEPA modified Method TO-15 and helium via ASTM D-1945

Section 2.7.1 of the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006.*

4. Contact

Chris Berotti

STANDARD OPERATING PROCEDURE

SG-003 Sub-slab Soil Vapor Collection

1. Objective

This procedure outlines the general steps to collect sub-slab soil vapor samples. The site-specific Sampling and Analysis Work Plan should be consulted for proposed sample locations, sample depths, and sampling duration.

2. Execution

Permanent and temporary sub-slab soil vapor probes will be installed using the procedures outlined below. All sub-slab soil vapor probes will be installed using a direct-push drill rig (e.g., Geoprobe® or similar), hand auger, or manually using a slide hammer.

2.1. Document Field Conditions

Document pertinent field conditions prior to installation of any probe locations.

- Record weather information (precipitation, temperature, barometric pressure, relative humidity, wind speed, and wind direction) at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport). Data should be obtained for the past 24 to 48 hours. Record the indoor conditions (temperature, heating/cooling system active, windows open/closed, etc.).
- Measure the differential pressure at the building. Measure the indoor and outdoor barometric pressure using a high resolution device. Where possible, measure the sub-slab barometric pressure at the sampling point.
- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified.
- Indoor floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, heating, ventilating and air conditioning (HVAC) system air supply and return registers, compass orientation (North), footings that create separate foundation sections, and any other pertinent information should be completed;
- Outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas.
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

2.2. Sub-Slab Soil Vapor Point Installation Specifications

Each sub-slab soil vapor point will be constructed as follows:

- Drill an approximately 3/8-inch hole through the slab. If necessary, advance the drill bit 2-3 inches into the sub-slab material to create an open cavity.
- Using dedicated inert Teflon or stainless steel tubing of laboratory or food grade quality, insert the inlet of the tubing to the specified depth below the slab. For permanent installation, only stainless steel tubing and fittings will be used.
- For permanent point installations, the annular space surrounding the vapor probe tip will be filled with a porous backfill material (e.g., glass beads or coarse silica sand) to cover 1-inch of the above the tip of the probe.
- Seal the annular space between the hole and the tubing using an inert non-shrinking sealant such as melted 100% beeswax, permagum grout, putty, etc. For permanent installations, cement may be used.
- For permanent points, a protective casing will be set around the top of the point tubing and grouted in place minimize infiltration of water or ambient air, as well as to prevent accidental damage to he permanent point.
- The tubing top will be fitted with a Swagelok® and cap to prevent moisture and foreign material from infiltrating the tubing.

In cases where sub-slab sampling is impractical or infeasible, a surrogate location (attached garage, concrete patio, asphalt driveway, etc.) may be used if it is representative of sub-slab conditions. In surrogate locations, the vapor sampling point may be installed in accordance with SOP SG-002 Soil Vapor Collection.

2.3. Sub-Slab Soil Vapor Sample Collection

Sub-slab soil vapor samples will be collected as indicated in the site-specific Sampling and Analysis Work Plan and in accordance with state or Federal guidance documents. Specifically, sub-slab samples from the points will be collected as follows:

- Document pertinent field conditions prior to sampling as described above.
- A suction pump will be used to remove one to three implant volumes from the sub-slab soil vapor points prior to sampling. Include the volume of any additional tubing added to affix sampling equipment and the annular space between the probe and the native material if sand or glass beads were used.
- The purge rate shall not exceed 0.2 liters per minute.
- Samples will be collected in an individually laboratory certified clean 1-liter SUMMA® canister (or equivalent) using a certified flow controller calibrated for the anticipated sample duration (4 minutes). The regulator flow rate will not exceed 0.2 liters per minute.
- A helium tracer gas will be used to identify any potential migration or short circuiting of ambient air during sampling as described below.

- Remove the protective brass plug from the canister. Connect the pre-calibrated flow controller to the canister.
- Record the identification numbers for the canister and flow controller.
- Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.
- Connect the tubing from the sub-slab soil vapor probe to the flow controller.
- Open the valve on the canister. Record the time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.
- Photograph the canister and the area surrounding the canister.
- Monitor the vacuum pressure in the canister routinely during sampling.
- Stop sample collection when the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.
- Record the final vacuum pressure and close the canister valve. Record the date and time that sample collection was stopped.
- Remove the flow controller from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Samples will be analyzed for volatile organic compounds (VOCs) and naphthalene via modified USEPA modified Method TO-15 and helium via ASTM D-1945
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. Maintain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory as soon as practical.
- All laboratory analytical data will be validated by a data validation professional in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, January 2005 and the USEPA Region II Standard Operating Procedure (SOP) for the Validation of Organic Data modified to accommodate the USEPA Method TO-15 and natural gas analysis by ASTM D-1945.

2.4. Tracer Gas Evaluation

The tracer gas evaluation provides a means to evaluate the integrity of the sub-slab soil vapor probe seal and assess the potential for introduction of indoor air into the sub-slab soil vapor sample. A tracer gas evaluation should be conducted on the each temporary sub-slab soil vapor probe to be sampled in a sampling event. A tracer gas evaluation should be conducted on the each permanent sub-slab soil vapor probe during the initial sampling event and a minimum of 10% of the sub-slab soil vapor probes during subsequent sampling events.

The following tracer gas evaluation procedure uses helium as a tracer gases which can be measured through laboratory analysis or by a portable detector.

- Retain the tracer gas around the sub-slab sample probe by filling an air-tight chamber (such as a plastic bucket) positioned over the sample location.
- Make sure the chamber is suitably sealed to the ground surface.
- Introduce the tracer gas into the chamber. The chamber will have tubing at the top of the chamber to introduce the tracer gas into the chamber and a valved fitting at the bottom to let the ambient air out while introducing tracer gas. Close the valve after the chamber has been enriched with tracer gas at concentrations >10%.
- The chamber will have a gas-tight fitting or sealable penetration to allow the sub-slab soil vapor sample probe tubing to pass through and exit the chamber.
- After the chamber has been filled with tracer gas, attach the sample probe tubing to a pump that will be pre-calibrated to extract sub-slab soil vapor at a rate of no more than 0.2 lpm. Purge the tubing using the pump. Calculate the volume of air in the tubing and purge one to three tubing volumes prior collecting an analytical sample or using a portable device to measuring the tracer gas concentration.
- Samples collected from vapor points during a tracer gas evaluation will be analyzed for VOCs and naphthalene via modified USEPA modified Method TO-15 and helium via ASTM D-1945.
- Alternately, a tracer gas detector may be used to verify the presence of the tracer gas in the chamber by affixing it to the valve fitting at the bottom of the chamber. The tracer gas detector may also be used to measure the tracer gas concentration in the pump exhaust during purging. If used, then record the tracer gas concentrations in the chamber and in the soil vapor sample.
- Based on the concentrations of the tracer gas detected during analysis or direct measurement, determine whether additional gas tracer evaluations are necessary:

If the evaluation on a probe indicates a high concentration of tracer gas in the sample (>10% of the concentration of the tracer gas in the chamber), then the surface seal is not sufficient and requires improvement via repair or replacement prior to commencement subsequent sample collection.

A non-detectable level of tracer gas is preferred; however, if the evaluation on a probe indicates a low potential for introduction of ambient air into the sample (<10% of the concentration of the tracer gas in the chamber), then proceed with the soil vapor sampling. While lower concentrations of tracer gas are acceptable, the impact of the detectable leak on sample results should be evaluated in the sampling report.

3. References

USEPA modified Method TO-15 and helium via ASTM D-1945.

Section 2.7.1 of the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

4. Contact

Chris Berotti

STANDARD OPERATING PROCEDURE

SG-004 Ambient Air Sample Collection

1. Objective

Describe procedures to collect ambient air samples. The site-specific Work Plan should be consulted for proposed sample locations and sampling duration.

2. Execution

2.1. Document Field Conditions

Document pertinent field conditions prior to sample collection:

- Record weather information, if available (such as precipitation, temperature, barometric pressure, relative humidity, wind speed, and wind direction) at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport). Data should be obtained for at least the past 12 hours.
- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified.
- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (North).
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

2.2. Sample Collection

- Samples should be collected in laboratory-certified clean SUMMA® canister (or equivalent) using a flow controller calibrated for the anticipated sample duration (1-hour, 8-hour, etc.). The regulator flow rate should not exceed 0.2 liters per minute.
- Place the canister at the sampling location. If the sample is collected from breathing height (e.g., 3 to 5 feet above ground), then mount the canister on a stable platform such that the sample inlet should be at the proper height.
- Remove the protective brass plug from canister. Connect the pre-calibrated flow controller to the canister.
- Record the identification numbers for the canister and flow controller.
- Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of custody form for each sample.

- Connect the tubing to the flow controller.
- Open the valve on the canister. Record the time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.
- Photograph the canister and the area surrounding the canister.
- If possible, monitor the vacuum pressure in the canister routinely during sampling. During monitoring, note the vacuum pressure on the gauge.
- Stop sample collection after the scheduled duration of sample collection but make sure that the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, call the laboratory and discuss the sample viability with them. Determine whether another sample will be taken after sharing the laboratory's opinion with your project manager.
- Record the final vacuum pressure and close the canister valves. Record the date and time that sample collection was stopped.
- Remove the flow controller from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. Maintain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory as soon as practical.

3. References

USEPA modified Method TO-15 and helium via ASTM D-1945

Section 2.7.1 of the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006.*

4. Contacts

Chris Berotti
Bill Simons

STANDARD OPERATING PROCEDURE
SI-002 Ozone System Inspection

1. Objective

The purpose of this Standard Operating Procedure (SOP) is to identify key procedures needed to maintain maximum system uptime of the ozone injection and soil vapor extraction (SVE) systems, and to ensure the system inspections are conducted safely.

2. Important Documents

- The system operator should be familiar with the documents listed below prior to conducting system inspections or maintenance on the system.
- System Operations Maintenance and Monitoring (OM&M) Plan – This is a site-specific document. This document specifies inspection schedules, analytical monitoring schedules, and specific inspection procedures.
- Manufacturer's Owner's Manual – This is a system specific document created by the manufacturer. This document contains system component information, maintenance and troubleshooting information, and instructions on how to use the system control logic. A copy of this document is retained at the Ozone Building.
- Training Videos – System training videos are available and located on GEIs network under the link below:

H:\TECH\project\Keyspan\BayShore\OU-1Ozone System\Training\Training Videos

3. System Process

- The ozone Injection system is designed to generate a 1-3 percent ozone gas mixture and sparge it directly into the subsurface through a series of stainless steel injection wells**.**
- Compressed air is first generated by a compressor. The compressed air is then passed through a series of filters before it is dried and cooled by a refrigerated dryer and a desiccant dryer, effectively bringing the dew point down to a maximum of -70 degrees Fahrenheit. The compressed air is then passed through the ozone generator where the ozone concentration is increased to 1 to 3 percent ozone gas mixture. The injection process is controlled by the human machine interface (HMI), three remote system manifolds, solenoid valves, and the control logic.

- A SVE system is also in place to capture any fugitive ozone gas or impacted soil vapor. The system consists of 11 soil vapor extraction laterals spaced throughout the injection well field. Vacuum is applied by the regenerative blower. The extracted vapor is passed through the blower and through two 500-pound carbon vessels and an ozone destruct unit prior to discharge through the stack.
- There are two identical system trains in place for both the SVE and ozone injection system. If one system goes down the other system will automatically start, maintaining near 100 percent system uptime.

4. System Components

- System components for a complete system train are listed below. The operator should reference the manufactures Owners Manual for details on each component.
- Ozone Injection System
- Kaeser Rotary SX-6 Screw Air Compressor
- Coalescing Filter (x2)
- Particulate Filter (x2)
- Condensate Filter
- Kaeser refrigerated dryer
- Kaeser desiccant dryer
- Cold Shot Split Water Chiller
- Ozonia Ozone Generator
- Ozone Delivery Manifold
- Ozone Compressor Pumps
- Remote system manifolds (x3)
- Injection Control Logic – HMI
- SVE System
- Rentron Regenerative Blower
- 240 gallon moisture separator
- 500 pound TetraSolve Granular Activated Carbon Vessel (x2)
- 250 pound TetraSolve Liquid Granular Activated Carbon Vessel (x2)
- Swhift Ozone Destruct Unit
- 11 SVE Laterals
- 1 Exterior SVE Manifold

5. System Inspections

The SVE system and the ozone injection system are monitored at least once per week to confirm that the systems are operating according to design and manufacture.

The inspections include:

- Inspection of the mechanical components.
- Recording of the operational pressures, temperatures, flow rates, and operational hours of the system components. These values should be compared to historical values to determine if there are any discrepancies.
- Emptying any condensate collection basins into properly labeled drums.
- Maintaining the drum storage area.
- Recording the injection pressures and flow rates at each injection point during a normal operational cycle. These values should be compared to historical values to determine if there are any discrepancies (semi-annual).
- Recording the vacuum pressures and flow rates at the SVE manifold.
- Monitoring the SVE effluent with a photoionization detector (PID).
- Analytical sampling of the SVE effluent at three locations, Pre-treatment, Mid-treatment, and Post-treatment (monthly).
- All information will be recorded on the inspection logs.

6. Regular Maintenance

Manufacturer recommended maintenance is performed twice to three times annually by an approved mechanic. Maintenance includes changing of the oil, filter elements, belts, and filter mats, as specified in the individual system component manual which are provided in the manufacturers Operations Manual. The system operator should keep a log of anything out of the ordinary and provide to the appropriate maintenance personnel. Typical things that should be noted are listed below:

- Rattling of solenoid valves can indicate that the valve is dirty and needs to be replaced.
- Drifting O3 percentage could indicate a problem with the UV lamp within the ozone monitor.
- Record any potential fluid or air leaks.
- Irregularity in the typical system component sounds. Listen to the operation of the compressor, ozone generator, booster pump, and dryer. If something doesn't sound right, it probably isn't.
- Report any of the items listed above to the system manager.

7. Alarm Acknowledgement

The SVE and ozone injection systems are equipped with a telemetry function that notifies the operator when the system goes down. The alarm is transmitted by email. The system operator will investigate the problem once an alarm message is received. Once the problem is identified, the system operator should contact the system manager. A decision will then be made on how the problem will be resolved. The system manager will then inform National Grid of the problem and the steps being taken to resolve the problem.

8. Health and Safety

Anyone entering the system will comply with the site-specific Health and Safety Plan (HASP). Additional Health and Safety hazards include:

- Elevated ozone levels – The PEL for ozone is 0.1 parts per million (ppm). The system will shut itself down if concentrations within the Ozone Generation Room meet or exceed this value. The system operator should verify ozone levels prior to entering the Ozone Generation Room at the office computer. The system operator will scan the breathing air within the room with a hand held ozone analyzer.
- Mechanical hazards when working on equipment – The system operator will ensure that the power is disconnected from the system components when maintenance has to be completed. This will be completed by shutting down the individual circuit breakers. Proper lock out/tag out procedures will be implemented in accordance with the HASP.

9. Site Contacts

Key site personnel are listed below. Refer to site-specific work plan for updated list.

- **System Manager**
  Jeff Parillo
  GEI Consultants, Inc.
  Office – 860.368.5374
  Cell – 631.481.5949
- **System Operator**
  Chris Berotti
  GEI Consultants, Inc.
  Office – 631.759.2961
  Cell – 631.481.5868
- **System Manufacturer**
  PIPER Environmental
  Anthony Rutland, System Technician
  Office – 831.632.2700

- **Maintenance Vender**
  Fenley and Nicol Environmental, Inc.
  Office – 631.586.4900
  Mike Ryan, Mechanic
  Cell – 516.768.8765
  Mathew Schieferstein, Project Manager
  Cell – 516.702.0025
- **Kaeser Representative**
  Industrial Sales and Service
  Tom Nelan, President
  Cell – 631.420.4800
  Office – 516.807.0463
- **Cold Shot Chiller Representative**
  The TurboChyll Company
  Sean Libby
  Office – 516.223.6494
  Fax – 516.223.6496

STANDARD OPERATING PROCEDURE
SI-002A - Ozone Injection System Fresh Air Purge

1. Objective

The purpose of this Standard Operating Procedure (SOP) is to identify the procedures needed to purge ozone from the injection lines and injection manifolds. Fresh air purges are a tool that the system operator can use to clear ozone gas from ozone generation equipment and piping.

Fresh air purges will be completed prior to conducting any maintenance on the ozone injection system and during any leak/pressure testing activities to ensure that the system maintenance is conducted safely with minimal chance of ozone exposure.

2. Fresh Air Purge Execution

The ozone Injection system is designed to generate a 1.0 to 3.0 percent ozone gas mixture and inject it directly into the subsurface through a series of stainless steel injection wells. There are two identical system trains in place for the Ozone injection system. Only one train is in operation at any given time. The injection process is controlled by the Human Machine Interface (HMI), three remote system manifolds, solenoid valves, and the control logic. The following steps will direct the system operator on how to conduct a fresh air purge.

2.1 Accessing the Ozone Generation Room and the HMI

- Follow proper health and safety procedures when entering the system from lobby area.
- Prior to entering, review ambient ozone levels and alarm history at the main computer.
- Before entering the ozone generation room, verify ambient ozone levels on the ozone monitor located outside of the doorway.
- Confirm the levels by using a handheld ozone monitor by screening through the fixed sampling port.
- If elevated ozone levels are present (0.1 parts per million (ppm) or above), do not enter the room. Once ozone levels reach 0.1 ppm, the system is programmed to shut down automatically. Wait until the ventilation system has had enough time to clear the room of ozone before entering.
- Enter the ozone generation room once you confirm that it is safe.
- The HMI is located on the eastern wall of the ozone generation room. Activate the touch screen by pressing anywhere on the screen.

2.2 Running the System in Rapid Cycle

- Access the Ozone System Run Screen* and shut off the operating ozone generation train. Follow the prompt on the screen and allow the system to purge.
- Access the Rapid Cycle Run Screen*, select all valves and desired purge time per valve. The default purge time is set at one minute per valve. Each of the 63 valves should be purged at least twice for a total purge time of 126 minutes. Choose the most recent ozone generation train in operation and turn rapid cycle on. The compressor on the injection skid will start running and compressed air will be injected though the lines. Confirm that the voltage reading on the ozone generators are reading 0 volts.
- The system should run in rapid cycle so that each injection point has been purged with air.
- Once the purge has completed, maintenance activities may begin.

*A security code is required to access the Ozone System Run Screen as well as the Rapid Cycle Run Screen. The security code will be provided by management as needed.

STANDARD OPERATING PROCEDURE

SI-002B - Ozone Injection Skid Maintenance

1. Objective

The purpose of this Standard Operating Procedure (SOP) is to identify the procedures needed to safely perform maintenance on the ozone injection skid, and limit the potential for exposure to ozone.

2. Ozone Injection Skid Maintenance Execution

The ozone injection skid includes ozone compressors that pressurize the ozone enriched air and delivers it through stainless steel piping to the injection manifolds located in the outbuildings. There are two ozone compressors, one for each treatment train. One ozone compressor is in operation at a time. Maintenance is conducted on the manifolds twice a year and includes checking the pump seals for leakage or ware and replacement as necessary. Additional maintenance may be needed if leaks develop.

Please follow all health and safety protocols and SOPs (SI-002 and SI-002A) before entering the ozone generation room. All injection skid maintenance will be performed by a minimum of two trained personnel.

2.1 Ozone Compressor Maintenance

- Operate the ozone injection system in rapid cycle (please see SI – 002A for rapid cycle operation) for a minimum of 30 minutes per train to clear any ozone from the injection lines, injection skid manifold, and ozone compressors.
- Please note that both ozone injection trains will need to be purged individually prior to conducting any maintenance.
- Isolate the train operating in rapid cycle. On the dormant pump, close the valve between the pump and the injection piping.
- While the system is operating in rapid cycle, determine which outbuilding manifold is injecting. Close the valves on the ozone manifold that are not injecting. Turn off rapid cycle. Immediately following the ozone compressor shut down, close the last ozone manifold valve. This should prevent back flow of ozone enriched air back into the injection skid and ozone compressors.
- Ozone injection lines will remain pressurized. When breaking any connection in the ozone injection line, a handheld ozone monitor must be used to verify the presence of any ozone levels contained inside the lines. The handheld ozone monitor sampling intake should be held as close to the opening as work will allow. If ozone is present, proper health and

safety precautions will be taken. If ozone is not observed at or above 0.1 parts per million (ppm), work will continue as planned.

- Once the ozone compressor maintenance is complete, open all valves and restart the system in rapid cycle. Leak test the entire manifold. Once you confirm that there aren't any leaks, initiate ozone injection through the Human Machine Interface (HMI).
- Screen each joint of the ozone compressor with the hand held monitor during ozone operation to confirm that ozone is not leaking. Once confirmed, the maintenance is complete.

STANDARD OPERATING PROCEDURE

SI-002C - Ozone Injection System Outbuilding Access

1. Objective

The purpose of this Standard Operating Procedure (SOP) is to identify procedures used to physically enter the remote outbuildings and to ensure that maintenance tasks are conducted safely with minimal chance of exposure to ozone. Potential maintenance includes sensor calibration/repair/replacement, leak testing, and valve/plumbing replacement.

2. Ozone Outbuilding Access

Three ozone injection manifolds are located in the well field on the southern side of the Groundwater Treatment Building. Each ozone injection manifold is housed in an outbuilding that covers the manifold and a portion of the trenching.

Each outbuilding is considered a permit required confined space unless the roof is removed and the sliding door on the south side of each building is open. The outbuilding roofs are heavy and will require two people using proper lifting methods to open properly. No personnel will enter the building unless these requirements are met:

- There must be two trained personnel on-site for the duration of any maintenance inside the outbuildings.
- Complete a fresh air purge prior to entering the outbuildings (please see section SI-002A).
- Before removing the outbuilding roof, screen ozone levels using a hand held ozone monitor. Insert the monitor in the screening port located on the northern wall of the outbuilding. Once the outbuilding roof has been removed and the door is open, screen the area for the presence of ozone. Start from the top and work your way down to the trench.
- Ozone injection lines will remain pressurized. When breaking any connection in the ozone injection lines, use a handheld ozone monitor to verify any ozone levels contained inside lines. The handheld ozone monitor sampling intake should be held as close to the opening as work will allow. If ozone is present, proper health and safety precautions will be taken. If no ozone is present, work will continue as planned.
- Complete all necessary maintenance. If a connection is broken, once re-plumbed, conduct a leak test using a fresh air purge.

The outbuildings must be closed if no one is on-site. The entrance procedure must be followed each time access is required.

STANDARD OPERATING PROCEDURE

SM-002 VOC Soil Sample Collection and Preservation Method

1. Objective

Describe methods to collect and preserve soil samples for analysis of Volatile Organic Compounds (VOCs) in accordance with the U.S. Environmental Protection Agency (EPA) Method 5035.

Some states have adopted soil sampling and preservation methods that vary from the procedures presented herein. Confirm that this method is appropriate for your project.

2. Execution

VOCs evaporate readily at normal temperatures and pressures. Care should be taken during sampling and preservation to limit the potential for VOCs to off-gas from the soil sample prior to being analyzed by the laboratory.

Soil samples should be obtained utilizing a small diameter core sampler such as a 10 milliliter (ml) plastic disposable syringe, an EnCore® sampler, an EasyDraw Syringe®. The EnCore® sampler is the only EPA-approved small diameter core sampler that can be used to collect the sample, store the sample, and transport the sample to the lab.

A separate soil sample must be collected and submitted to the laboratory for percent solids testing. At least approximately 20 grams of soil must be collected in a separate glass or plastic sampling container.

2.1. Collection and Preservation of Soil Samples

Three types of soil samples may be collected for VOCs analysis:

- High (typically >200 µg/kg) VOC concentration soil sample (Section 2.2 below)
- Low (typically 0.05-200 µg/kg) VOC concentration soil sample (Section 2.3 below)
- Synthetic Precipitation Leaching Procedure/Toxicity Characteristic Leaching Procedure (SPLP/TCLP) soil sample (Section 2.4 below)

2.2. Collection and Preservation of a Soil Sample with “High” Concentrations of VOCs (typically >200 µg/kg)

2.2.1. Option 1 – Methanol Preservation Method

Supplies include: an electronic field balance (in some cases), two VOC vials (per sample) with 10 ml methanol (the number of vials and amount of methanol might vary among labs), and a small diameter core sampler to collect an approximately 10 gram soil sample. Some labs, and EPA method 5035, specify a 5 gram soil sample. Check with the lab or project manager for the amount to collect.

Sampling Procedure:

- Weigh the VOC vials containing the methanol and record the weight. Some laboratories provide pre-weighed VOC vials.
- If you are weighing your samples, take a test sample with the sampler and weigh it to evaluate how close you are to the appropriate sample weight. If the laboratory VOC vial is pre-marked with a line, then you do not need to weigh the soil, just fill the VOC vial with soil until the methanol and soil mixture reaches the line.
- Collect the sample using the sampling device and extrude the sample into the preserved VOC vial. Be sure that the VOC vial and cap threads are free of soil, and then screw the cap tightly onto the VOC vial. Gently swirl the methanol in the VOC vial to coat the soil sample. Do not vigorously shake the vial.
- If necessary, weigh the VOC vial and record the weight. Some laboratories will weigh the vials at the lab, and it is not required in the field.
- Collect separate soil samples from the same area for percent solids and head space sampling.
- Samples must be frozen or analyzed within 14 days.

2.2.2. Option 2 – EnCore® Sampling Method

Supplies needed: One 5 or 10 ml EnCore® sampler.

Sampling Procedure:

- Label the EnCore® sampling container.
- Collect the soil sample quickly, wipe the sampler free of soil, and seal the sampler.
- Place sampler in a clean ziplock bag and place on ice in a cooler.
- Collect separate samples in separate containers for percent solids and head space sampling.
- Samples must be frozen, or preserved, or analyzed within 48 hours (requires coordination with the laboratory).

2.3. Collection and Preservation of a Soil Sample with "Low" Concentrations of VOCs (typically 0.5 to 200 µg/kg)

2.3.1. Option 1 – Water Preservation Method

Supplies required: an electronic field balance, two 40 ml VOC vials pre-weighed and containing 5 ml of water, a magnetic stirrer, and a sampling device.

Sampling Procedure:

- Use a small diameter core sampler to collect two soil samples (5 grams each) into pre-weighed 40 ml VOC vials with 5 ml of water and a magnetic stirrer. Wipe threads and cap and seal the VOC vial. Repeat for the second VOC vial.
- Weigh the VOC vials and record the weights.
- Collect separate samples in separate containers for percent solids and head space sampling.
- Samples must be frozen or analyzed within 14 days.

2.3.2. Option 2 – Collection into Unpreserved VOC Vials

Supplies required: electronic field balance, two 40 ml VOC vials pre-weighed, and a sampling device.

Sampling Procedure:

- Collect the sample using the sampling device and extrude the sample into the VOC vial. Be sure that the threads are free of soil, and cap and seal the VOC vial. Repeat for the second vial.
- Weigh the VOC vials and record the weights.
- Collect separate samples in separate containers for percent solids and head space sampling.
- Samples must be frozen or analyzed within 48 hours (requires coordination with the laboratory).

2.3.3. Option 3 – Collection in VOC Vials Preserved with Sodium Bisulfate

Supplies required: electronic field balance, two VOC vials pre-weighed with 5 ml of sodium bisulfate, a magnetic stir bar, and a sampling device.

Sampling Procedure:

- Collect the sample using the sampling device and extrude a 5 gram sample into the VOC vial containing the sodium bisulfate. Wipe threads and cap and seal the VOC vial. Repeat for the second VOC vial.
- Weigh the VOC vials and record the weights.

- Collect separate samples in separate containers for percent solids and head space sampling.
- Samples must be frozen or analyzed within 14 days.

2.3.4. Option 4 –EnCore® Sampling Method

Supplies required: two 5 gram EnCore® samplers.

Sampling Procedure:

- Label the EnCore® sampling container.
- Collect the soil sample quickly, wipe the sampler free of soil, and seal the sampler.
- Place sampler in a clean ziplock bag and place on ice in a cooler.
- Collect separate samples in separate containers for percent solids and head space sampling.
- Repeat previous steps with the second EnCore® device.
  Samples must be frozen, or preserved, or analyzed within 48 hours (requires coordination with the laboratory).

2.4. Collection of samples being analyzed for VOCs by the TCLP or SPLP method

Sampling methods for TCLP or SPLP are similar to the methods presented above. The appropriate method is determined by local regulations. If using an EnCore® sampler, a 25 gram sampler should be used.

3. General Guidance

- Each state and federal regulatory agency has unique soil preservation requirements. Always verify collection and preservation methods with governing bodies.
- Verify preservation techniques with laboratory prior to sample collection.

4. Contacts

Lynn Willey
Mark Ensign

STANDARD OPERATING PROCEDURE

SM-003 Classification of Soil Samples in the Field

1. Objective

Describe methods to classify soil samples collected in the field in a consistent manner.

2. Execution

- Describe soil samples according to *ASTM D2488-09a, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) and* Attachments A and B*.* This standard is the basis for the Unified oil Classification System.
- Identify and record the soil in terms of the major and minor constituents (i.e., sand gravel, silt, clay), Unified Soil Classification Symbol, sample structure, plasticity and dilatancy for fine-grained soils, color, local or geologic name if known (e.g., Boston Blue Clay or glacial till), odor, presence of iron or other staining, and presence of organic matter, shells, debris, or other unusual characteristics of the same.
- If a soil split-spoon sample contains more than one soil type (for example, the upper portion is silty sand and the lower portion is clay) describe each type separately.
- Record sampler type, blow counts, soil description, etc. on the boring log (see Attachment C).
- GEI consistently applies one modification to the ASTM standard: Use "widely graded" and "narrowly graded" instead of "well-graded" and "poorly graded," respectively.

3. Limitations

Certain projects or clients will require the use of other classification systems. Other classification systems should not be used unless specifically required by the client. If the client requires that we use the Burmister method, obtain the details from the client. An example breakdown is shown below, but some clients (MassDOT, for example) have their own breakdown.

- “and” = 35-50%
- “some” = 20-35%
- “little” = 10-20%
- “trace” = 1-10%

- Describing soil samples is often difficult during cold or wet weather. Make sure your field notes describe these conditions. When possible, collect archive samples and verify sample descriptions in the office.

- The ASTM Standard Practice for Classification of Soils for Engineering Purposes (D2487) may be used in conjunction with the Visual-Manual Method to confirm the soil classification. D2487 includes laboratory testing.

4. References

ASTM D2487-06e1, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM, 2006.

ASTM D2488-09a, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM, 2009.

Field Guide for Soil and Stratigraphic Analysis, Midwest Geosciences Group Press, 2001-2005.

Coarse-Grained Soils Visual-Manual Descriptions, GEI Consultants, Soil Description Chart.

Fine-Grained Soils Visual-Manual Descriptions, GEI Consultants, Soil Description Chart.

5. Attachments

Attachment A – GEI Soil Description Charts (2007)
Attachment B – Visual Manual Descriptions with example boring log
Attachment C – Describing the Plasticity of Soil Samples

6. Contacts

Lynn Willey
Cathy Johnson

FINE-GRAINED SOILS
VISUAL-MANUAL DESCRIPTIONS

GEI Consultants

SOILS WITH ≥50% FINES

Group Symbol				Group Name
CL	<30% plus No. 200	<15% plus No. 200		LEAN CLAY
		15-25% plus No. 200	% Sand ≥% Gravel	LEAN CLAY WITH SAND
			% Sand <% Gravel	LEAN CLAY WITH GRAVEL
	≥30% plus No. 200	% Sand ≥% of Gravel	<15 % Gravel	SANDY LEAN CLAY
			≥15% Gravel	SANDY LEAN CLAY WITH GRAVEL
		% Sand <% of Gravel	<15 % Sand	GRAVELLY LEAN CLAY
			≥15% Sand	GRAVELLY LEAN CLAY WITH SAND
ML	<30% plus No. 200	<15% plus No. 200		SILT
		15-25% plus No. 200	% Sand ≥% Gravel	SILT WITH SAND
			% Sand <% Gravel	SILT WITH GRAVEL
	≥30% plus No. 200	% Sand ≥% of Gravel	<15 % Gravel	SANDY SILT
			≥15% Gravel	SANDY SILT WITH GRAVEL
		% Sand <% of Gravel	<15 % Sand	GRAVELLY SILT
			≥15% Sand	GRAVELLY SILT WITH SAND
CH	<30% plus No. 200	<15% plus No. 200		FAT CLAY
		15-25% plus No. 200	% Sand ≥% Gravel	FAT CLAY WITH SAND
			% Sand <% Gravel	FAT CLAY WITH GRAVEL
	≥30% plus No. 200	% Sand ≥% of Gravel	<15 % Gravel	SANDY FAT CLAY
			≥15% Gravel	SANDY FAT CLAY WITH GRAVEL
		% Sand <% of Gravel	<15 % Sand	GRAVELLY FAT CLAY
			≥15% Sand	GRAVELLY FAT CLAY WITH SAND
MH	<30% plus No. 200	<15% plus No. 200		ELASTIC SILT
		15-25% plus No. 200	% Sand ≥% Gravel	ELASTIC SILT WITH SAND
			% Sand <% Gravel	ELASTIC SILT WITH GRAVEL
	≥30% plus No. 200	% Sand ≥% of Gravel	<15 % Gravel	SANDY ELASTIC SILT
			≥15% Gravel	SANDY ELASTIC CLAY WITH GRAVEL
		% Sand <% of Gravel	<15 % Sand	GRAVELLY ELASTIC SILT
			≥15% Sand	GRAVELLY ELASTIC SILT WITH SAND
OL/OH	<30% plus No. 200	<15% plus No. 200		ORGANIC SOIL
		15-25% plus No. 200	% Sand ≥% Gravel	ORGANIC SOIL WITH SAND
			% Sand <% Gravel	ORGANIC SOIL WITH GRAVEL
	≥30% plus No. 200	% Sand ≥% of Gravel	<15 % Gravel	SANDY ORGANIC SOIL
			≥15% Gravel	SANDY ORGANIC SOIL WITH GRAVEL
		% Sand <% of Gravel	<15 % Sand	GRAVELLY ORGANIC SOIL
			≥15% Sand	GRAVELLY ORGANIC SOIL WITH SAND

ID OF INORGANIC FINE SOILS FROM MANUAL TESTS

Symbol	Name	Dry Strength	Dilatancy	Toughness*
ML	Silt	None to low	Slow to rapid	Low or thread cannot be formed
CL	Lean Clay	Medium to high	None to slow	Medium
MH	Elastic Silt	Low to medium	None to slow	Low to medium
CH	Fat Clay	High to very high	None	High

1. GROUP NAME and (SYMBOL)
2. Describe fines, sand, and gravel components, in order of predominance. Include plasticity of fines. Include percentages of sand and gravel.
3. Color
4. Sheen, odor, roots, ash, brick, cementation, torvane and penetrometer results, etc.
5. "Fill," local name or geologic name, if known

PEAT

Peat refers to a sample composed primarily of vegetable matter in varying stages of decomposition. The description should begin: PEAT (PT) and need not include percentages of sand, gravel or fines.

CRITERIA FOR DESCRIBING PLASTICITY

Description	Criteria
Nonplastic ML	A 1/8-in. (3 -mm) thread cannot be rolled at any water content
Low Plasticity ML, MH	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit *
Medium Plasticity MH, CL	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit
High Plasticity CH	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit

* Toughness refers to the strength of the thread near plastic limit. The lump refers to a lump of soil drier than the plastic, similar to dry strength.

COARSE-GRAINED SOILS

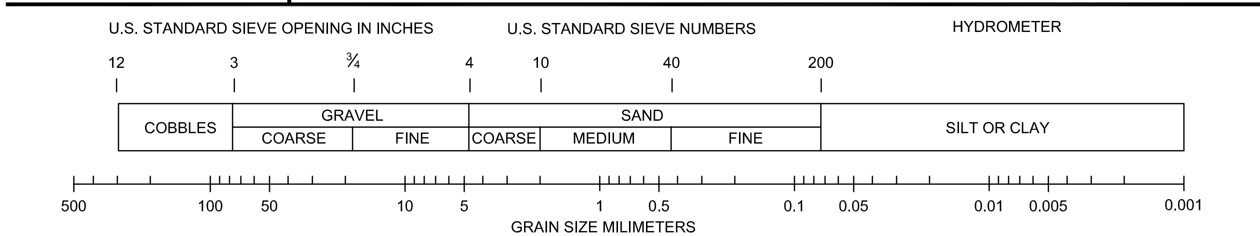
VISUAL-MANUAL DESCRIPTIONS

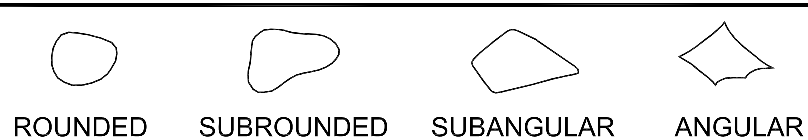
TYPICAL SOIL COLORS

- YELLOW
- OLIVE
- LIGHT BROWN
- BROWN
- REDDISH BROWN
- RED
- GRAY
- BLACK

SOILS WITH <50% FINES

				GROUP SYMBOL		GROUP NAME
GRAVEL % Gravel > % Sand	≤5% Fines	WIDELY GRADED		GW	<15% Sand	WIDELY GRADED GRAVEL
					≥15% Sand	WIDELY GRADED GRAVEL WITH SAND
		NARROWLY GRADED		GP	<15% Sand	NARROWLY GRADED GRAVEL
					≥15% Sand	NARROWLY GRADED GRAVEL WITH SAND
	~10% Fines	WIDELY GRADED	Fines = ML or MH	GW-GM	<15% Sand	WIDELY GRADED GRAVEL WITH SILT
					≥15% Sand	WIDELY GRADED GRAVEL WITH SILT AND SAND
			Fines = CL or CH	GW-GC	<15% Sand	WIDELY GRADED GRAVEL WITH CLAY
					≥15% Sand	WIDELY GRADED GRAVEL WITH CLAY AND SAND
		NARROWLY GRADED	Fines = ML or MH	GP-GM	<15% Sand	NARROWLY GRADED GRAVEL WITH SILT
					≥15% Sand	NARROWLY GRADED GRAVEL WITH SILT AND SAND
			Fines = CL or CH	GP-GC	<15% Sand	NARROWLY GRADED GRAVEL WITH CLAY
					≥15% Sand	NARROWLY GRADED GRAVEL WITH CLAY AND SAND
	≥15% Fines		Fines = ML or MH	GM	<15% Sand	SILTY GRAVEL
					≥15% Sand	SILTY GRAVEL WITH SAND
			Fines = CL or CH	GC	<15% Sand	CLAYEY GRAVEL
					≥15% Sand	CLAYEY GRAVEL WITH SAND
SAND % Sand ≥ % Gravel	≤5% Fines	WIDELY GRADED		SW	<15% Gravel	WIDELY GRADED SAND
					≥15% Gravel	WIDELY GRADED SAND WITH GRAVEL
		NARROWLY GRADED		SP	<15% Gravel	NARROWLY GRADED SAND
					≥15% Gravel	NARROWLY GRADED SAND WITH GRAVEL
	~10% Fines	WIDELY GRADED	Fines = ML or MH	SW-SM	<15% Gravel	WIDELY GRADED SAND WITH SILT
					≥15% Gravel	WIDELY GRADED SAND WITH SILT AND GRAVEL
			Fines = CL or CH	SW-SC	<15% Gravel	WIDELY GRADED SAND WITH CLAY
					≥15% Gravel	WIDELY GRADED SAND WITH CLAY AND GRAVEL
		NARROWLY GRADED	Fines = ML or MH	SP-SM	<15% Gravel	NARROWLY GRADED SAND WITH SILT
					≥15% Gravel	NARROWLY GRADED SAND WITH SILT AND GRAVEL
			Fines = CL or CH	SP-SC	<15% Gravel	NARROWLY GRADED SAND WITH CLAY
					≥15% Gravel	NARROWLY GRADED SAND WITH CLAY AND GRAVEL
	≥15% Fines		Fines = ML or MH	SM	<15% Gravel	SILTY SAND
					≥15% Gravel	SILTY SAND WITH GRAVEL
			Fines = CL or CH	SC	<15% Gravel	CLAYEY SAND
					≥15% Gravel	CLAYEY SAND WITH GRAVEL





1. GROUP NAME and (SYMBOL)
2. Structure , if any. (stratified layer thicknesses, lenses, varves, gradational changes)
3. Describe sand, gravel and fines components, with percentages, in order of predominance. Include max gravel size. For test pits give percent cobbles and boulders, by volume, and include max size.
4. Color
5. Sheen, odor, roots, ash, brick, cementation, reaction with HCL, etc.
6. "Fill," local name or geologic name, if known

Describing the Plasticity of Soil Samples
M. Paster – November 2008

References ASTM D 2487 – Soil descriptions – lab
ASTM D 2488 – Soil descriptions – field
ASTM D 4318 – Atterberg limits testing

GEI Practice for Boring and Test Pit Logs

Describe the fines as:

Non-plastic
Low plasticity (The GEI laminated sheets incorrectly use “slightly plastic” for “low plasticity.”)
Medium plasticity
High plasticity

Example: ~25% low plasticity fines

Toughness and dry strength:

You should use these tests to help decide how plastic the fines are. Record the results in the remarks column of the field log, but not in the soil description and not necessarily in the typed log.

On final logs, if Atterberg limits tests have been performed:

Do not use the descriptive terms non-plastic, low plasticity, etc. for samples on which Atterberg limits tests have been run. Instead, just give the percentage of fines and then report the actual Atterberg limits at the end of the description.

For example, the end of a silty sand description might be:
. . . ~25% fines, ~10% gravel max size ½ inch, gray. PL=23, LL=35.

(Atterberg limits tests are performed on the fraction of the sample finer than the No. 40 sieve, not just the fines. So the Atterberg limits data applies to the sample, not just to the fines.)

Hints:

High plasticity soils are rare in New England. If you think it’s high plasticity, it’s probably medium. Some Boston blue clay and some Connecticut River varved clays are high plasticity, but if you think you’ve found some, check with the project manager.

In New England, if ~10% fines or more, generally stick with GM, SM, ML, and CL. Occasionally GC, SC, CH. Don’t use MH unless you have Atterberg limits data.

Estimating plasticity in the field, GEI guidance based on ASTM D 2488:

Plasticity	1/8-inch thread	Dry strength	Toughness
non	Cannot be rolled at any water content.	Dry specimen crumbles when handled.	Only slight pressure needed to roll thread near plastic limit.
low	Thread can barely be rolled.	Dry specimen crumbles with some finger pressure.	Slight to medium pressure needed to roll thread near plastic limit.
medium	Thread is easy to roll. Not much time needed to reach plastic limit.	Dry specimen crumbles with considerable finger pressure.	Medium pressure needed to roll thread near plastic limit.
high	Takes considerable time rolling and kneading to reach plastic limit.	Dry specimen cannot be broken with finger pressure.	Considerable pressure needed to roll thread near plastic limit.

Non-plastic vs. low plasticity:

ASTM D 2488 (soil descriptions - field) defines non-plastic and low plasticity based on the 1/8-inch thread as shown in the table above.

ASTM D 4318 (Atterberg limits testing) indicates that a sample should be called non-plastic for either of the following cases:

- The liquid limit test (dropping the cup) or the plastic limit test (rolling out the thread) cannot be performed because the plasticity is too low.
- The plastic limit is greater than or equal to the liquid limit.

Unfortunately, there are some soils that are low plasticity based on D 2488 (a thread can be rolled), but are non-plastic based on D 4318 (the liquid limit cannot be measured or PL≥LL).

GEI considers these soils to have low plasticity, because that is how they "look" and "feel." We want to document this information so that other people will have a better feel for what the soil looks like and how it behaves. So, if the soil was low plasticity based on D 2488, but non-plastic based on D 4318, that should be explained in the letter or report, and possibly in a note on the log.

BORING LOCATION	Maple Ave Sidewalk	DATE START/FINISH	2/14/07 - 2/15/07
GROUND ELEVATION (NGVD)		DRILLED BY	Geologic: M. Costigan
GROUNDWATER EL.	DATE	LOGGED BY	T. Kahl/M. Yako
		TOTAL DEPTH (FT)	25

B101

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	PID JAR HS / REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0–0.3						FILL	4" pavement
	0.5–2.5	S1	13-9 17-14	24	0	0.5 ppm	FILL	S1: Redrove 0.5 to 3.5 ft. Recovery 11": WIDELY GRADED SAND (SW) ~85% sand, ~10% gravel to 1", <5% nonplastic fines, brown. Contains brick fragments and ash. Fill.
	2.5–5					hard drilling 3 to 4 ft, possible boulder	FILL	
	5–7	S2	7-7 11-13	24	8	2.0 ppm	FILL	S2: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ~65% mostly fine sand, ~25% gravel to 3/4 inch ~10% non-plastic fines, brown. Fill.
	7–9	S3	9-10 2-1	24	16	0.0 ppm	FILL / ORGANICS	S3 (0-10"): Similar to S2. S3 (10"-16")": ORGANIC SILT (OL) ~100% slightly plastic fines, dark gray, organic odor, contains white shell fragments.
	12–14	S4	WOH 1-2 1	24	15	0.0 ppm	ORGANICS	S4: Similar to S3, bot 6".
	15.5					hard drilling at 15.5 ft		
	17–18.3	S5	20-35 50/3"	15	8	Top of rock ~19 ft. Roller bit to 20 ft.	TILL	S5: SILTY SAND WITH GRAVEL (SM) ~60% mostly fine sand, ~25% slightly plastic fines, ~15% gravel to 1/2 inch, olive. Glacial Till.
	20–25	C1	RQD 70%	60	54	lost ~10 gallons drill fluid from 23 to 25 ft	ROCK	C1: SCHIST, hard, slight weathering at joint surfaces, joints at ~30 degrees from horizontal and generally parallel to foliation, gray. Marlborough Formation.
	25							Bottom of Boring 25 ft Truck-mounted drill rig. 4-inch casing to 19 ft. Safety-hammer with rope and cathead for SPT. Backfilled with drill cuttings.

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES > 4 IN./ LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
1: Groundwater at 10 ft depth at start of day 2/15/07.

PROJECT 07999-0
DATE

GEI Consultants

EXAMPLE SOIL DESCRIPTIONS

SANDY SILT (ML) ~60% slightly plastic fines, ~40% mostly fine sand, 1" thick layer of fine to medium sand with <20% fines, gray.

LEAN CLAY (CL) ~90% moderately plastic fines, ~10% fine sand, olive. Boston Blue Clay. Sv = 0.5, 0.5, 0.8 tsf, Qp = 1.0, 1.5, 1.6 tsf

Stratified CLAYEY SAND (SC) and WIDELY GRADED SAND (SW) SC layers 1 to 2 inches thick consist of fine sand with ~30% moderately plastic fines, gray. SW layers 1 to 4 inches thick consist of fine to coarse sand, ~10% gravel to 1/2 inch, <5% fines, brown. Hydraulic Fill.

EXAMPLE ROCK DESCRIPTIONS

(0-9"): GRANITE, hard, one piece, joint surface slightly weathered, pink.
(6-60"): PHYLLITE, joints ~ 45° generally parallel to foliation, 9" to 44" moderate to severe jointing and joint weathering. 44" to 60" single piece, green-gray.

ARGILLITE, medium hard, moderately weathered joints, gray. Cambridge Argillite.

GEOPROBE AND ROTOSONIC

When SPTs are not performed, note sample density (sands) or stiffness (clays) in description.

CRITERIA FOR DESCRIBING DILATANCY OF FINE-GRAINED SOILS

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing.

SPT: Standard Penetration Test

30-inch drop with 140-lb hammer
1 3/4 to 2 1/4 turns around cathead
2-inch O.D. split spoon sampler

ENV'L TERMINOLOGY FOR SOIL DESCRIPTIONS

- **Ash** - Typically silt-size to medium sand-size.
- Do not use the term "cinders." This is not a technical term. Instead, use "ash," "burnt wood," "burnt material," or a similar term.
- **Coal-like material** - If it looks like coal but you aren't sure.
- **Clinker** - Vitrified (glass-like) or heat-fused material. Often burned impurities in coal. Often looks like pumice, but heavier.
- **Slag** - Similar to clinker, but normally refers to residue from metal ore processing.

- **Sheen** - Iridescent petroleum-like sheen. Not to be used for a "bacterial sheen," which can be distinguished by its tendency to break up on the water surface at angles. Petroleum sheen will be continuous and will not break up.
- **Stained** - Use with a color ("brown-stained") to indicate that the soil is stained a color other than its natural (unimpacted) color.
- **Coated** - Soil grains are coated with NAPL (oil, tar, etc.). There is not enough NAPL to saturate the pore spaces. ("Split spoon sampler coated with brown oil." "Soil grains coated with gray substance with slight gasoline-like odor.")
- **Saturated** - The entire sample pore space is saturated with NAPL. If you use this term, be sure it is not water saturating the pore spaces. Depending on viscosity, the NAPL may drain from a soil sample. ("Sample saturated with green, sticky substance.")
- **Blebs** - Discrete sphericals of NAPL in a soil matrix that was not visibly coated or saturated. ("Occasional blebs of reddish-brown tar.")
- **Oil** - Exhibits a petroleum odor, different from MGP odors.
- **Tar** - Exhibits an MGP odor (e.g. naphthalene-like odor).

- **Odors** - Use terms such as "naphthalene-like odor" or "petroleum-like odor." Use modifiers (strong, moderate, slight) to indicate odor intensity.