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Sent: Tuesday, February 06, 2018 12:29 PM
To: Spellman, John (DEC)
Cc: Beam, Steve A; Edwards, James; Root, Mary; Kopcow, Daniel
Subject: Ingalls Ave RAWP - Revised Text and Figures
Attachments: Revised Section 4.8.13_pg 25-30 of PDF.pdf; Revised Fig. 2 and 10.pdf

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John,

Sorry that I missed your call today. Based on my discussions with Steve last week, we have revised the language in Section 4.8.13 and updated Figs. 2 and 10 of the RAWP. These replacement files are attached. Please replace the pages in your current copy with these. Due to the additional language added to Sect. 4.8.13, new text wrapped to the following pages, so I have included 5 pages of text for replacement.

Give me or Steve a call if you have any questions or need any more information. Also, let me know if you would like a full revised version of the RAWP or any portion.

PJ

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be employed for the deeper excavations. The need for temporary excavation support will be governed by the applicable OSHA regulations. Selection of the temporary support methods will be performed by the Remedial Contractor.

The Remedial Contractor will be required to remove debris and impacted soil to the depths identified in this work plan. Based on these dimensions and the footprint and depths specified, approximately 270 cubic yards of soil will be removed from the excavation areas. Excavated soil and debris may be directly loaded into trucks, or into roll-off containers, or may be stockpiled on-site for subsequent sampling and disposal. Prior to backfilling, a visual demarcation barrier will be installed at the bottom of the excavation to indicate the vertical limit of excavation.

4.8.13 Soil Sampling for Confirmation

After the excavation in each of the five identified remedial areas is completed, excavation sampling will be performed for confirmation purposes. Samples will be collected by the Engineer, with support from the Remedial Contractor. Sample collection frequency will be a minimum of one (1) sidewall sample for every 30 linear feet of sidewall, and a minimum of one (1) bottom sample for every 900 square feet of excavation, in accordance with the NYSDEC DER-10. Because it is anticipated that each of the five remedial areas will be less than 900 square feet, it is anticipated that five samples will be collected from each remedial area (four sidewall samples and one bottom sample). Where NYSDEC determines such sampling will not be representative of conditions in the excavation in which case NYSDEC may request additional sidewall and/or bottom samples for documentation.

The soil samples collected for confirmation will be analyzed for free cyanide EPA Method 9016, and total cyanide EPA Method 9014. The samples will be analyzed by a NYS ELAP-certified laboratory. If the confirmation samples exceed the limits for total or free cyanide identified in the ROD, National Grid and the Remedial Contractor will perform additional excavation and sampling. The limits of the additional excavation will be selected in the field based on visual observations and discussions between GEI, National Grid, and the NYSDEC.

The analytical results from the confirmation samples will be validated, and a DUSR prepared. The results of the confirmation sampling will be provided to the NYSDEC in the construction completion report.

4.8.14 Excavation Dewatering

Each of the excavated areas will remove soil from above the elevation of the groundwater table. Therefore, excavation dewatering is not anticipated to be needed for the RA.

4.8.15 Restoration

A demarcation barrier will be placed at the bottom and sidewalls of each of the excavations. Restoration will then include backfilling of the excavations with imported soil meeting DER-10, Appendix 5 requirements. The final ground surface elevation of the excavated areas will be approximately the same as the grade prior to remedial excavation. The surface of the disturbed areas will be restored using ordinary fill that conforms to general requirements for material designation 733-10 in the September 4, 2014 Standard Specification prepared by the New York State Department of Transportation, the fill will have a pH greater than 5, and less than 10. Ordinary Fill shall be comprised of hard, durable sand and gravel, free of clay, organic matter, surface coatings, trash, debris, and other deleterious materials. Soil finer than the No. 200 sieve (the “fines”) should be non-plastic. Ordinary fill shall meet the following gradation requirements:

<u>U.S. Standard Sieve</u>	<u>Percent Finer by Dry Weight</u>
2-inch	100
0.25-inch	30 to 65
No. 40	5 to 40
No. 200	0 to 10

4.8.16 Waste Management

4.8.16.1 On-Site Waste Management

On-site storage will take place in accordance with applicable laws and regulations dealing with the type of waste being stored. Liquid wastes will be stored in appropriate tanks or drums. Solid waste materials (soil and fill) will be stored in covered stockpiles or roll-off containers.

4.8.16.2 Dewatering Effluent and Decontamination Water

Effluent associated with excavation dewatering or decontamination activities will be pumped into a bulk storage tank located outside of the excavation areas. The tank will be sufficiently sized to contain the wastewater and provide some measure of primary treatment (settling). Decontamination water will then be disposed of off-site following profiling by National Grid’s waste vendor. The disposal information will be included in the final report.

4.8.16.3 Storm Water Runoff Control

The excavation areas are within a vacant area, and storm water is currently managed by infiltration or surface runoff to the Hudson River. During work for the RA, the control and diversion of storm water runoff is important to reduce the potential for water to accumulate in the remedial excavations.

Storm water contact with the impacted soils will be limited due to site grading or localized erosion and sediment control around the area of excavation. Therefore, it is not anticipated that surface runoff will enter into the excavation areas. The Remedial Contractor will be required to utilize appropriate control measures to direct runoff away from the excavation areas. Storm water runoff control measures may include the installation of berms and barriers.

4.8.16.4 Decontamination

The objectives of the decontamination activities are to provide the equipment necessary to decontaminate personnel and equipment to prevent cross-contamination from the excavation area to public areas (i.e., highways, roads, support trailer, vehicles, etc.).

Decontamination Procedures

The Remedial Contractor will establish decontamination areas for the following activities:

- Personnel decontamination
- Equipment decontamination

Personnel Decontamination Station

A personnel decontamination station where workers can drop equipment and remove personal protective equipment (PPE) will be set up within the work zone. It 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.

Equipment Decontamination Station

Heavy equipment decontamination will be performed within the limits of the on-site decontamination pads. Heavy contamination will be brushed 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.

Decontamination/anti-tracking pads will be located where equipment leaves the site. The pad(s) will be sufficiently sized to ensure that the largest piece of equipment can be adequately decontaminated.

If necessary, effluent from equipment decontamination will be collected and pumped into a bulk tank. Disposal of the wastewater will be handled by National Grid's waste vendor.

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

4.8.16.5 Material Transport Vehicle Decontamination

Trucks transporting soil off-site will enter the excavation area as shown on Figure 14. Care will be exercised when loading trucks so as not to spill material on the outside of the trucks. Upon exiting the excavation area, the Remedial Contractor will stage the trucks on the equipment decontamination/anti-tracking pad. Trucks will then be visually inspected (i.e., box sidewalls, tailgate, and tires) and brushed off, if necessary, to remove visual soil particles. Trucks or roll-off containers must be equipped with solid sealable covers and the use of mesh roll top covers will not be allowed.

Decontamination Equipment

The Remedial Contractor will be responsible for maintaining a sufficient supply of materials/equipment as required to implement decontamination procedures.

4.8.16.6 Waste Disposal Characterization

A preliminary plan for profiling and characterization for disposal is described below. However, to ensure that the most current requirements of the targeted disposal facilities are met prior to mobilization, the analyses will need to be updated and confirmed with the facilities before mobilization for sample collection. Profiling and characterization activities is the responsibility of the Remedial Contractor.

Landfill Facilities

Excavated materials that may be disposed of at a landfill facility will be characterized following excavation. Three National Grid-approved facilities are discussed below. However, the final list of potential facilities will need to be confirmed prior to remediation. The target facilities currently considered for landfill disposal include:

- Colonie Landfill, Cohoes, New York
- Ontario County Landfill, Stanley, New York
- Seneca Meadows Landfill, Waterloo, New York

To meet the sample requirements of these facilities, the pre-characterization samples will be analyzed for the following:

- Toxicity Characteristic Leaching Procedure (TCLP) ZHE Extraction – U.S. EPA Method 1311;
- TCLP VOC – U.S. EPA Method 1311/8260B;

- TCLP Semi-Volatile Organic Compound (SVOC) – U.S. EPA Method 1311/8270C;
- TCLP Inductively Coupled Plasma (ICP) Metals – U.S. EPA Method 6010B;
- TCLP Herbicides – U.S. EPA Method 1311/8151A;
- TCLP Pesticides – U.S. EPA Method 1311/8081A;
- TPH – U.S. EPA 8015 GRO/DRO;
- VOC Target Compound List (TCL) – U.S. EPA Method 8260C;
- SVOC TCL – U.S. EPA Method 8270D;
- Total Cyanide – U.S. EPA Method 9014A;
- Polychlorinated Biphenyl (PCB) – U.S. EPA Method 8082;
- Reactive Sulfide – U.S. EPA Method 7.3.4.1;
- Reactive Cyanide – U.S. EPA Method 7.3.3.2;
- Ignitability – U.S. EPA Method 1010/Flashpoint;
- Corrosivity / pH – U.S. EPA Method 9045;
- BTU/Heat of Combustion – ASTM D240 -09 Standard;
- % Sulfur – U.S. EPA D129-64 91;
- Total Residue/Percent Solids – U.S. EPA D-2216-90; and
- RCRA 8 Total Metals – U.S. EPA 6000-7000 Series (arsenic, mercury, silver, selenium, lead, chromium, barium, and cadmium).

The number of samples required for characterization and profiling will be confirmed with the facilities prior to mobilization. For the sample analysis, a NYSDOH ELAP-certified laboratory will be utilized. Level II reports will be prepared for the sample delivery groups. The chain-of-custody record and the laboratory Form I Report sheets for the analyses will be provided to the Remedial Contractor and the target disposal facilities. The analytical results will also be included in the final report by the Engineer.

4.8.16.7 Off-Site Transportation and Disposal

The Remedial Contractor will coordinate the transportation and disposal of the excavated material with the designated receiving facilities. Excavated materials will be transported by a NYS permitted waste hauler to the receiving facilities. Transportation of impacted materials will be performed in accordance with all NYSDEC and New York State Department of Transportation (NYSDOT) regulatory requirements for hazardous/non-hazardous materials/waste. Trucks will be checked for loose soil or other materials and odors before leaving the site. Loose soil or other materials will be removed prior to departure.

Non-hazardous waste shipments will be documented using standard waste manifests as required by applicable NYSDEC and NYSDOT waste regulations. Other waste materials that have no specific documentation requirements will be documented using waste tracking forms, bills of lading, and receipts. Each waste shipment will be documented, and will include a description of the type and amount of waste being transported and the name and location of the receiving facility. National Grid or National Grid's designated representative will sign the manifests. Off-site trucking will generally follow the haul route shown on Figure 14.

4.8.16.8 Record Keeping

Copies of manifests and/or bills of lading for all shipments will be submitted to the Construction Manager/Engineer prior to the loaded vehicle departing the site. A log of waste shipments and copies of manifests and/or bills of lading will be maintained by the Construction Manager/Engineer on site. Upon completion of the RA, the Engineer will provide National Grid with logs, manifests and/or bills of lading. Copies of the logs, manifests, and bills of lading will be included in the RA Report following completion of the RA to create a permanent record of disposal.



- SOURCES:**
1. Aerial Photograph From Bing Maps, Accessed Via ArcGIS Online © 2010 Microsoft Corporation and its Data Suppliers, Accessed on 8/16/2016.
 2. Figure 2: Site Plan from OU-3 Basis of Design Report, Troy - Smith Avenue Former MGP Site, Prepared by GEI Consultants, Date: May 2013.



Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

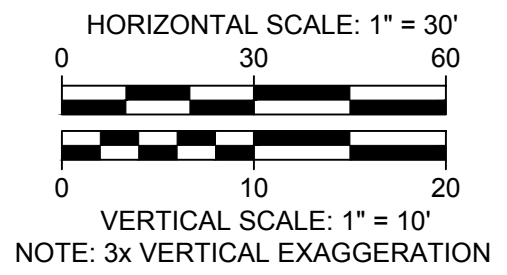
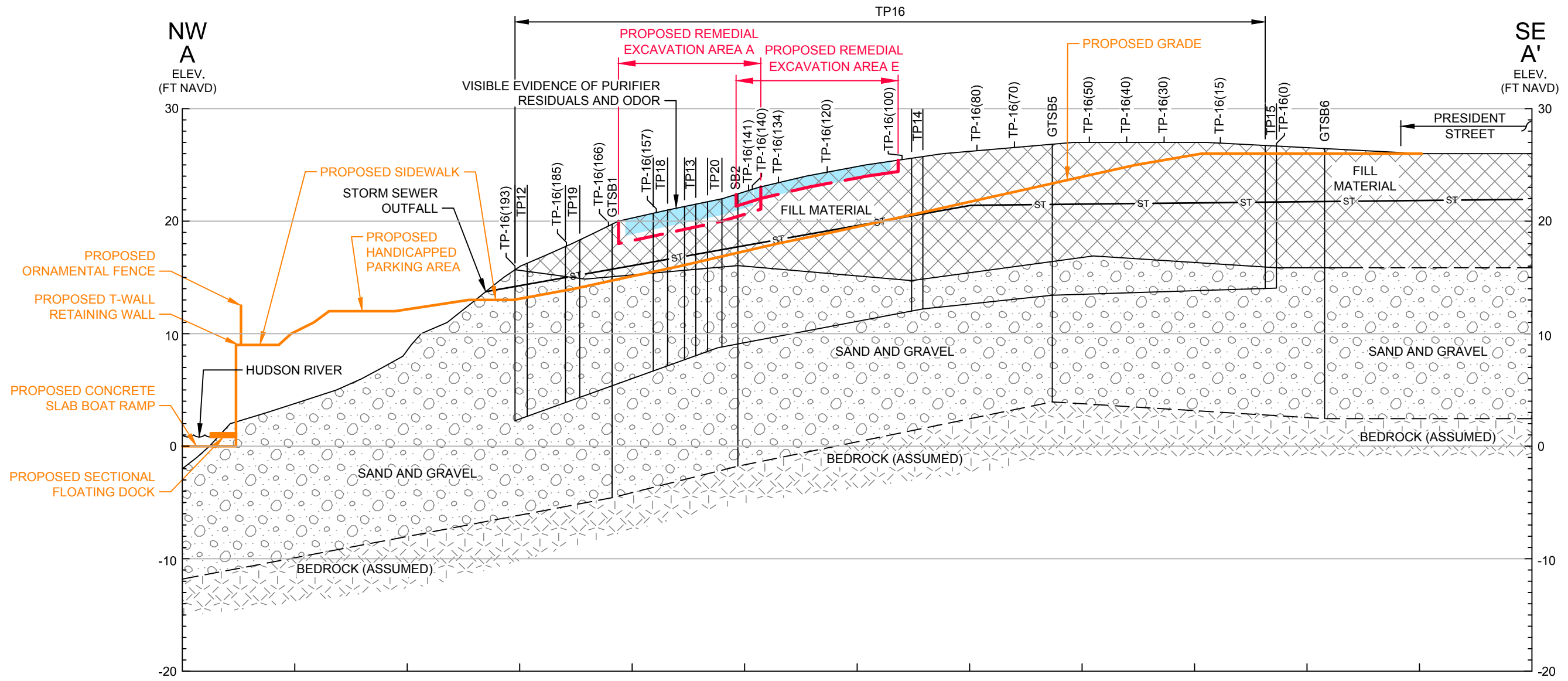
nationalgrid

GEI Consultants
 Project 116830

SITE LAYOUT AND
 OPERABLE UNITS

January 2018

Fig. 2



- LEGEND:**
- CITY OF TROY PROPOSED EXCAVATION AREA
 - - - REMEDIAL EXCAVATION AREA
 - ST — STORM SEWER PIPE (APPROXIMATE)
 - OBSERVED PURIFIER RESIDUALS AND ODOR
- GEOLOGY**
- FILL MATERIAL
 - SAND AND GRAVEL
 - BEDROCK (ASSUMED)

Remedial Action Work Plan Ingalls Avenue Area - OU2 Troy Smith Avenue Former MGP Site Troy, New York		CROSS SECTION A-A'
	Project 116830	January 2018

Fig. 10



Consulting
Engineers and
Scientists

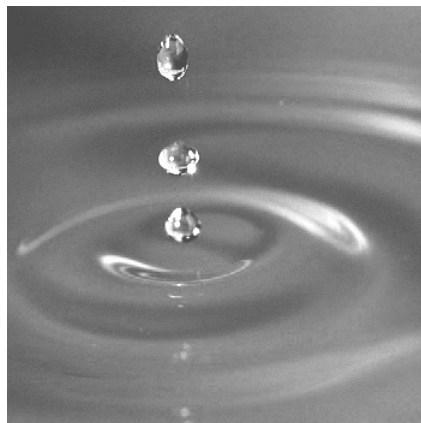
Remedial Action Work Plan for Soil Excavation Operable Unit 2 – Ingalls Avenue Area Troy (Smith Avenue) Non-Owned Former MGP Site

Troy, New York
NYSDEC Site # 442030
Index #: A4-0473-0000

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January 24, 2018
Project #116830.1405.14052



PJ Snyder, P.E.
Project Manager

Daniel Kopcow, P.E., PMP
Engineer of Record

Engineer's Certification

In accordance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER) DER-10 Section 1.5 (b) 1, I, Daniel Kopcow, certify that I am currently a New York State registered professional engineer, and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



01/24/2018

Engineer's Seal
GEI Consultants, Inc., P.C.

Date

It is a violation of New York State Education Law for any person, unless acting under the direction of a licensed professional engineer, to alter in any way plans, specifications, plates, and reports to which the seal of a professional engineer has been applied. If an item bearing the seal of an engineer or land surveyor is altered, the altering engineer shall seal the item and add the notation "altered by", sign and date such alteration, and provide a specific description of the alteration.

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- B. Community Air Monitoring Plan
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PJS:mlr

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Abbreviations and Acronyms

bgs	Below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAMP	Community Air Monitoring Plan
COC	Constituents of Concern
CY	Cubic yard
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Program
GEI	GEI Consultants, Inc., P.C.
H2H	H2H Associates, LLC
HASP	Health and Safety Plan
ICP	Inductively Coupled Plasma
MGP	Manufactured Gas Plant
NAPL	Non-Aqueous Phase Liquid
NM	Niagara Mohawk
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
OU1	Operable Unit No. 1
OU2	Operable Unit No. 2
OU3	Operable Unit No. 3
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
PID	Photo-ionization Detector
PPE	Personal Protective Equipment
ppm	Parts per million
RA	Remedial Action
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
ROD	Record of Decision
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
SEC	Special Environmental Conditions
SMP	Site Management Plan
SVOC	Semi-Volatile Organic Compound
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

1. Introduction

This Remedial Action Work Plan (RAWP) provides the New York State Department of Environmental Conservation (NYSDEC) with the scope and methods for the removal of impacted soil from Operable Unit No. 2 (OU2) Ingalls Avenue Area of the Troy (Smith Avenue) Non-Owned Former Manufactured Gas Plant (MGP) site, in Troy, New York.

The fill and soils to be removed in this Remedial Action (RA) are the soils in OU2 described in the NYSDEC document entitled “*NYSDEC Division of Environmental Remediation – Record of Decision (ROD), NM – Troy Smith Ave. MGP, Operable Unit Numbers: 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030,*” dated March 2011 [NYSDEC, 2011].

The remediation of the Troy MGP site is being performed in accordance with the guidelines of the NYSDEC, the New York State Department of Health (NYSDOH), the United States Environmental Protection Agency (EPA), and the National Contingency Plan. The remedy for the site will be implemented according to the specifications of the NYSDEC Division of Environmental Remediation (DER) document entitled “*DER-10 / Technical Guidance for Site Investigation and Remediation,*” (DER-10), dated May 3, 2010 [NYSDEC, 2010].

Background information, RA objectives, Pre-Design Investigation (PDI) results, and the proposed field and reporting activities for this RA are described below.

1.1 Work Plan Organization

This work plan is organized into the following sections and appendices:

- **Section 1 – Introduction.** This section describes the site and the previous investigations.
- **Section 2 – Pre-Design Investigation.** This section summarizes the results of the PDI.
- **Section 3 – Design Basis.** This section presents the basis for the RA, including the elements of the remedy from the ROD, the RA objectives, and the rationale for establishing the limits and depths of the excavations.
- **Section 4 – Remedial Action Field Activities.** This section describes the tasks that will be implemented for the RA.
- **Section 5 – Reporting.** This section describes the reporting requirements for the RA.
- **Section 6 – Schedule.** This section presents the proposed RA schedule.

- **Section 7 – References.** This section lists the references cited in this document.

The following are provided as Appendices to this work plan:

- **Appendix A – Subsurface Soil Boring and Test Pit Logs** – Boring and test pit logs for the soil borings advanced during the PDI and previous investigations.
- **Appendix B – Community Air Monitoring Plan (CAMP)** – The CAMP to be implemented during the excavation and backfilling activities.
- **Appendix C – Health and Safety Plan (HASP)** – The HASP that will be implemented during the site activities.

1.2 Site Background and Description

The Troy (Smith Avenue) Former MGP site is listed by the NYSDEC as Site No. 442030. The site is being addressed by National Grid, in accordance with the 2003 Order-On-Consent (Index #A4-0473-0000) between National Grid and the NYSDEC. The site location is shown on Figure 1.

The NYSDEC has identified three operable units for the Troy (Smith Avenue) Former MGP site. The locations of the operable units are shown on Figure 2. The required remedial action has been implemented in Operable Unit No. 1 (OU1), which is the area of the former MGP operations, and in Operable Unit No. 3 (OU3), which is an area located immediately adjacent (west) to OU1 in the Hudson River, and within the southern approach to the United States Army Corps of Engineers (USACE) Troy Lock and Dam.

Based on observations made during previous investigations and remedial activities, a former disposal action has been identified at OU2. The disposal area is within the footprint of a historic dam and canal (Old Troy Dam and Canal) which was connected to the Hudson River. It is GEI's understanding that the canal was used by a paper company and clothing manufacturer until it was filled-in around 1915.

Some areas within OU2 contain purifier residuals which are mixed in with the historic fill material. The residuals are believed to be derived from the coal gas purification process performed during historic MGP operations at OU1. Based on the historic land use for OU2, and the observed presence of non-MGP-related fill materials, there appears to have been other sources (municipal and industrial materials) of the historic fill placed at OU2.

The current features of OU2 and the surrounding area are shown on Figure 3. The area is mostly vacant. A gravel and asphalt roadway, Ingalls Avenue Extension (Ingalls Ave) is present near the center of the site. This roadway is primarily used for access to the Hudson River shoreline. The City of Troy has developed a plan to construct a new boat launch at OU2, in the area along and to the north of the existing roadway. A new park (Ingalls Park)

will be constructed around the boat launch, predominantly in the City-owned parcel located to the north of Ingalls Ave.

1.3 Previous Investigations and Remedial Action

The previous investigations performed at the site are summarized below.

- Foster Wheeler Environmental Corporation (Foster Wheeler), on behalf of National Grid, performed characterization activities in the central area of OU2 in 1998 to assess the concentrations of constituents of concern (COC) for identified purifier residuals. A comparison of the results of the analyses to the results of samples collected at OU1 was also performed. The results of the characterization were summarized in the document entitled “*Waste Characterization Report for the Ingalls Avenue Site, Troy, New York,*” dated December 1998 [Foster Wheeler, 1998].
- An RA at the site was conducted by Foster Wheeler in 1999. Approximately 14 tons of impacted fill was excavated, and the impacted material was characterized and disposed at an off-site location. The report summarizing the remedial action is entitled “*Draft Waste Removal Report for the Niagara Mohawk Power Corporation Ingalls Avenue Site, Troy, New York,*” dated August 1999 [Foster Wheeler, 1999]. The Remedial Area addressed by Foster Wheeler is shown on Figure 5. For this work plan, this area is designated Area E. Additional remedial work and laboratory analyses will be performed in Area E, to address remaining impacted soil at this location.
- A soil analysis was conducted at the site by Foster Wheeler in 2001. Eight soil borings were advanced and one monitoring well was installed. The analytical data is included in the letter report to National Grid entitled “*Analytical Data, Troy Ingalls Avenue, Operable Unit 2,*” dated November 2001 [Foster Wheeler, 2001].
- An additional Site Investigation was performed by Tetra Tech in 2003. Test pits were excavated within and adjacent to the footprint of the former canal within OU2. The results of the Tetra Tech investigation were summarized in the document entitled “*Draft Site Investigation Report, Niagara Mohawk a National Grid Company, Ingalls Operable Unit, Troy, New York,*” dated November 2003 [Tetra Tech, 2003].
- Tetra Tech performed a Supplemental Investigation at OU2 in 2006. Two additional test pits were excavated at OU2 to assess the presence or absence of purifier residuals. The results of the soil assessment were summarized in the document entitled “*Supplemental Investigation Summary Report, National Grid Troy (Smith Ave.) Ingalls Ave Former MGP Site, Troy, New York,*” dated January 2007 [Tetra Tech, 2007].
- H2H Associates, LLC (H2H), on behalf of the City of Troy, performed an Environmental Site Investigation for OU2, and the adjacent area to the north. The results of the soil assessment were summarized in the document entitled

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“Environmental Site Investigation Report, Future Ingalls Park Site, Troy, New York,” dated October 2009, revised January 2010 [H2H, 2010].

- A Special Environmental Conditions (SEC) Report was prepared by Tetra Tech in 2010. The report was prepared to provide background information for OU2, and also to identify requirements and procedures that were identified for implementation when the City of Troy redevelops the parcels. The document is entitled *“Special Environmental Conditions, Ingalls Avenue Boat Launch Project, Ingalls Avenue Site, Inactive Hazardous Waste Site #4-42-030, Operable Unit 2, City of Troy, Rensselaer County”* dated October 2010 [Tetra Tech, 2010].

The locations of the explorations completed by Tetra Tech, the total cyanide results (where sampled) and remedial Area E are shown on Figure 5.

2. 2017 Pre-Design Investigation

A PDI was performed by GEI at the Ingalls Avenue Area in 2017. The results of the PDI were provided to the NYSDEC in the report entitled “*Pre-Design Investigation Report, OU2 Ingalls Avenue Area, Troy (Smith Avenue) Former MGP Site, Troy, New York, NYSDEC Site # 442030,*” dated August 15, 2017 [GEI, 2017]. The NYSDEC indicated approval for the report in a letter to National Grid dated September 15, 2017.

The PDI was performed to obtain additional data needed to prepare the plan for implementation of the remedy for OU2. The PDI exploration locations are shown on Figure 6. The total and free cyanide results from the PDI are shown on Figure 7, and the identified remedial excavation areas are shown on Figure 8. The objectives for the PDI included the following:

- Investigating and observing the subsurface conditions using test pits and soil borings to evaluate the presence or absence of visible evidence of purifier residuals.
- Analyzing samples collected during the investigation program to measure the concentrations of total and free cyanide.
- Collecting geotechnical data from the borings and test pits for the design of the engineering controls that may be required for the remedy.
- Observing the physical characteristics and composition of the fill and subsurface soil to aid with the development of a soil management plan (if necessary).
- Observing the presence or absence of groundwater in the potential remedial excavation area to aid with the development of a water management plan during the remedial action (if necessary).
- Collecting data for site topography and other existing conditions for the remedial design.
- Investigating, marking, and documenting existing utilities present at OU2 for the remedial design.

The paragraphs below summarize the results of the PDI performed at OU2 that are relevant for the preparation of the RAWP. An overview of the observations made during the investigation, and the nature and extent of MGP-related purifier residuals, is presented by areas of concern and by media, as shown in Figure 6.

2.1 Site Geology

The observations regarding the geology of the site are shown on the plan showing the locations of the cross-sections (Figure 9), and on Cross Section A-A' (Figure 10), Cross Section B-B' (Figure 11), and Cross Section C-C' (Figure 12).

- Anthropogenic fill materials are present throughout OU2. The fill is thickest along the former Troy Canal footprint, located in the central area of OU2.
- Underlying the fill is alluvium comprised of silt, sand, gravel, and cobbles.
- Bedrock is present at a depth of approximately 25 feet.

2.2 Site Hydrogeology

- There are no surface water features at OU2. Surface water during storm events flows by sheet flow to the west towards the Hudson River.
- The water table in the alluvium is believed to be approximately 21- to 26-feet-deep.
- The direction of groundwater flow in the alluvium is from east to west, towards the Hudson River.

2.3 Nature and Extent of Constituents of Concern

Two discrete areas with MGP-related purifier residuals were identified during the PDI.

2.3.1 *City of Troy Ingalls Avenue Boat Launch Excavation Area*

- A near-surface layer of MGP-related purifier residuals was observed to the north of the Ingalls Avenue roadway. The area of impact is approximately 26-feet-long, 36-feet-wide, and 1.5-feet-thick.
- Laboratory analyses of the impacted material indicates that the residuals contain total cyanide in concentrations exceeding the total cyanide Soil Cleanup Objective (SCO). However, free cyanide concentrations were less than the free cyanide SCO.
- Test pits, soil borings, and associated laboratory analyses were used to delineate the horizontal and vertical extent of the residuals in the impacted area.

2.3.2 *Outside (South) of the City of Troy Ingalls Avenue Boat Launch Excavation Area – Ingalls Park Area*

- A second area of impact was identified to the south of the proposed boat launch area. This area is outside of the area identified for soil removal during construction of the proposed City of Troy boat launch.

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- A thin, discrete layer of brown peat-like residual material was identified at a depth of approximately 8 feet. The layer appeared to be approximately 12-inches in thickness and about 3 feet in length. Based on the remainder of the test pit excavation and adjacent soil borings, this layer appeared to be very limited in thickness and horizontal extent.
- Laboratory analyses of the soil samples identified total cyanide in concentrations exceeding the total cyanide SCO. However, concentrations of free cyanide were not detected.

3. Remedial Action Basis and Soil Volume

The basis for the remedial action and the estimated soil excavation volumes are summarized in this section.

3.1 OU2 Record of Decision

Based on the observed presence of purifier residuals at OU2, the NYSDEC has required that a RA be performed to address impacted material. The identified RA for OU2 is described in the document entitled “*NYSDEC Division of Environmental Remediation – Record of Decision, NM – Troy Smith Ave. MGP, Operable Unit Numbers: 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030,*” dated March 2011 [NYSDEC, 2011].

The Area of Proposed Waste and Soil Removal identified in the ROD for OU2 is shown on Figure 4. The NYSDEC-selected remedy includes the following:

- **Excavation** – The RA will be excavation and off-site disposal of historic fill impacted by purifier residuals in the proposed City of Troy boat launch area. The cleanup criteria identified for the remediation are 27 mg/Kg for free cyanide, and 72 mg/Kg for total cyanide [NYSDEC, 2011].
- **Soil Cover** – A soil cover will be installed to allow for Restricted - Residential Use of the site.
- **Site Management** – A Site Management Plan (SMP), including an Institutional (environmental easement) and Engineering Control Plan, and a Monitoring Plan will be developed if impacts above the applicable SCOs remain.

3.2 Remedial Action Objectives

The Remedial Action Objectives (RAOs) are established as the overall goals for the site remediation to provide protection of human health and the environment. They are developed given the applicable New York State Standards, Criteria and Guidance (SCGs) and the intended land use. The RAOs developed for OU2 of the site, specified in the ROD, are summarized below.

Soil

- Prevent ingestion / direct contact with soil exceeding applicable SCOs.
- Prevent inhalation of constituents of concern, including dust, from the soil.
- Prevent migration of COC that would result in groundwater or surface water impacts.

Soil Vapor

- Prevent inhalation of impacted indoor air due to soil vapor with COC intruding into existing buildings.
- Prevent inhalation of soil vapor COC due to soil vapor intrusion into future buildings that may be constructed at the site.

Groundwater was not identified as a media of concern for OU2 of the site in the NYSDEC ROD.

3.3 Remedial Areas

Four areas (A-D) are targeted for soil removal in this RA. The location of each area is shown on Figure 8, and the coordinates for the remedial excavation areas are shown on Figure 13 and provided in Table 1. The soil removal excavation footprint and removal depth was developed based on:

- The soil identified by GEI or Tetra Tech with visible evidence of purifier residuals present and associated laboratory samples collected which indicated exceedances of the SCOs for OU2 of 27 mg/Kg for free cyanide, and 72 mg/Kg for total cyanide.
- Industry-standard practices for excavation and temporary excavation support.

The basis for the soil removal for each area is summarized as follows:

- **Area A** – The presence of observed purifier residual material in soil in the area between TP16(140) and TP16(166). The laboratory analyses of soil from TP16(140)(0-0.4) which had a concentration of total cyanide of 180 mg/Kg. The limits of the area were further defined by the absence of impacts at GTSB1 and SB2.
- **Area B** – The presence of observed purifier residual material in soil between TP17(45) and TP17(48). The laboratory analyses of soil from TP17(48)(8-9) which had a concentration of total cyanide of 130 mg/Kg, and material collected from this location designated as TP17(peat) which had a total cyanide concentration of 96 mg/Kg. The limits of the area were further defined by the absence of impacts at the northern and southern portions of TP17, and the associated non-impacted soil samples collected from the test pit.
- **Area C** – The presence of observed purifier residual material in soil in the eastern portion of TP7, and the western portion of TP9. The laboratory analyses of soil from TP7(5-6) which had a concentration of total cyanide of 195 mg/Kg. The limits of the area were defined by the absence of impacts in the other portions of these test pits, and the absence of impacts in test pit TP21.

- **Area D** – The presence of observed purifier residual material in soil in the western portion of TP8. The laboratory analyses of soil from TP8(10-10.5) which had a concentration of total cyanide of 137 mg/Kg. The limits of the area were defined by the absence of impacts in the eastern portion of this test pit, by the absence of impacts at TP13, and the absence of impacts at SB1 and SB3.
- **Area E** – Four of five of the confirmation samples collected following the remedial work performed by Foster Wheeler in 1999 showed that soil with total cyanide exceeding the SCO of 72 mg/kg remained in the remedial area. Therefore, additional excavation work and sampling is proposed in this work plan to address the impacts that remain in this area. The limits of Area E are defined by samples: IA-PE-01, IA-PE-02, IA-PE-03, and IA-PE-04 (Figure 5). The Remedial Area E shown on Figure 5 encompasses the area of remaining impacted soil identified at the conclusion of the remedial work performed by Foster Wheeler [Foster Wheeler, 1999].

3.4 Estimated Volume for Soil Excavation

The volumes of soil exceeding SCOs were estimated to provide the basis for the soil excavation task. Soil volumes exceeding the SCOs were estimated as the product of the impacted area and impacted depths. Although fill or non-impacted soil may be present above the impacted zone, this soil was included in the volume estimates because it would need to be excavated to gain access to the deeper impacted soil in most of the areas. Because the soil and fill contains debris and appears unsuitable for reuse for backfill, impacted and non-impacted soil excavated from the identified remedial areas is targeted for removal. The accessible soil volume on the site was estimated to be approximately 270 cubic yards (CY). The soil volume calculations are provided in Table 1. Also included in the table are the locations (northings and eastings) of each remedial area, along with the identified target excavation depths.

4. Remedial Action Field Activities

4.1 Scope of Work

The RA scope of work includes the following:

- Citizens Participation Fact Sheet development and distribution;
- Access agreements;
- Permitting;
- Import soil characterization;
- Site control and health and safety monitoring;
- Community air monitoring;
- Site preparation;
- Soil excavation and backfilling;
- Waste management and disposal; and
- Restoration.

The field activities will be coordinated between National Grid and several contractors and stakeholders as follows:

- **Remedial Contractor** – National Grid will select a remedial contractor (Remedial Contractor) to perform the RA activities. All Remedial Contractor staff and subcontractors working within the exclusion zone will be OSHA Hazardous Waste Operator (HAZWOPER) 40-hour trained. Subcontractors will include waste transportation contractors and disposal facilities.
- **Engineer/Construction Manager** – GEI will provide pre-construction- and construction-phase engineering and design services, serve as the project Construction Manager, and will provide full-time construction observation. This includes the observation and documentation of the field activities, preparation of daily field reports, and the RA Final Completion Report. GEI will also perform the CAMP monitoring and reporting activities.
- **National Grid** – National Grid will coordinate with the property owner, contractors, construction manager, the NYSDEC and NYSDOH.
- **Property Owner** – National Grid will work with the property owner (City of Troy) to establish an access agreement for work to be performed on the parcels.

4.2 Citizen Participation

Prior to the start of the remedial field activities, a NYSDEC Notice and Fact Sheet will be sent to the site contact list for the Troy (Smith Avenue) Former MGP site. The Engineer will work with the NYSDEC (as directed by National Grid) to prepare the Notice and Fact Sheet that will be distributed to the parties on the contact list. This list typically includes the residents and business owners within a specified distance from OU2. Also included are local community and political staff, as appropriate, as approved by National Grid.

4.3 Access Agreements

An access agreement currently exists between the City of Troy and National Grid. This agreement will be reviewed, and updated, if necessary, to allow the remedial activities to be performed.

4.4 Local Permits

Local permits may be required for various aspects of this project. They may include, but not be limited to, the excavation and site restoration work, storm water pollution prevention, road closures, the construction of temporary roadways, driveways and parking areas, and noise. Specifically, a local permit may be required if adjacent roadways (such as President Street or Ingalls Avenue) are temporarily closed during the remedial activities. The requirements for the local permits will be confirmed prior to mobilization, and copies of the permits provided to the NYSDEC. The Remedial Contractor will be responsible for obtaining the necessary permits for the work.

4.5 Wastewater Discharge Permit and Approval

Because the excavations will be completed above the groundwater table, the need for the management of wastewater from the remedial activities is not anticipated. However, this work plan includes provisions for the management of wastewater should water be generated due to unforeseen circumstances.

Dewatering effluent and decontamination water may be containerized and disposed of off-site at a liquid waste disposal facility. Should this management option be implemented, the Remedial Contractor will be required to obtain approval from a properly licensed National Grid-approved disposal facility. Approvals from the properly licensed and National Grid-approved disposal facilities will be obtained prior to beginning any excavation work.

Water may be containerized, tested, and then discharged to the sewer present adjacent to the site (Presidential Street). If the sewer is identified as an effective option for water management, then an approval letter/permit from the City of Troy will be required. The permit request will describe the requirements for operating an on-site wastewater treatment

system (to remove COC related to the site), the discharge criteria testing required, and the specifics of the discharge of pre-treated wastewater to the sanitary sewer.

4.6 Traffic Control

Figure 14 shows the intended trucking route for the work. Impacted materials and debris will be removed from the site via Ingalls Avenue. Imported backfill will be transported by the same route. Generally, the Traffic Control figure indicates the traffic routes to and from the site for:

- Trucking soil and bulky waste / debris off-site.
- Importing clean fill and topsoil to the site.
- Liquid waste hauler off-loading dewatered liquids (if necessary).

4.7 Imported Backfill Material

Prior to site mobilization, the Remedial Contractor will identify sources of common backfill and topsoil. Samples will be collected by the Engineer or the Remedial Contractor at the identified facilities to ensure that the proposed material would be appropriate for use as backfill and cover for the remedial excavation areas.

The sampling performed will be consistent with the specifications of Table 5.4(e)10 of the NYSDEC DER-10. Included in Appendix B of the NYSDEC document, is a table from DER-10 entitled “*Allowable Constituent Levels for Imported Fill or Soil Subdivision 5.4(e)*” [NYSDEC, 2010]. The results of the backfill and topsoil analyses will be compared to the allowable constituent levels for Restricted-Residential Use. All COC identified by the NYSDEC DER-10 document will be analyzed for. The results of the sampling will be provided to National Grid and then to the NYSDEC for approval prior to importing the materials to the site. The sources selected by the Remedial Contractor will meet the applicable National Grid and NYSDEC requirements.

The samples will be analyzed by a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory. The chain-of-custody record for the sampling and the laboratory data packages, and the Data Usability Summary Reports (DUSRs) will be submitted to the NYSDEC for review, and included in the final report.

4.8 Implementation of the Remedy

This section describes the anticipated approach for performing the remedial activities at the site.

4.8.1 Pre-Construction Meeting

The Engineer will conduct a pre-construction site meeting, with the Remedial Contractor, National Grid, the owner (City of Troy), and the NYSDEC prior to the commencement of remedial field activities. The meeting will be held to review specified construction requirements and schedules, as well as to review the responsibilities of the Remedial Contractor, the Engineer, and National Grid with respect to the RA implementation.

4.8.2 Site Security

Temporary site security measures will be used to restrict access and minimize health and safety concerns for the neighboring public. Other site security measures will be implemented at the discretion of the Remedial Contractor to minimize the potential for vandalism/destruction of construction equipment.

Excavation Perimeter Security

If excavations will be left open overnight, a temporary barrier will be erected around the perimeter of each of the four remedial work areas. The barrier and associated signage will be maintained by the Remedial Contractor, and will be kept in place until backfill has been placed to within 2 feet of the existing grade.

Equipment Security

Vehicles and/or equipment left in the work area will be secured at the end of each working day. It is the responsibility of the Remedial Contractor to secure their vehicles and equipment and to ensure that all non-essential equipment is de-energized when left on-site and not in use to prevent electrical/fire/explosive hazards.

4.8.3 Implementation of Safe Work Procedures

The Safe Work Procedures will be implemented by the Remedial Contractor, with input from the Construction Manager and Engineer.

- Health and Safety Kick-off meetings and HASP procedures will be reviewed on a daily basis by all staff assigned to the site.
- Sign In and Out Sheets will be maintained in the job trailer or other facility as determined by the Remedial Contractor. All site workers and other site personnel will be required to sign in and out each work day.
- Signage and temporary barriers will be maintained, especially around open excavation areas.
- Vehicles (backed in) and equipment will be parked in a designated area and all keys removed.

- The Remedial Contractor will maintain an organized work area and properly organize and store equipment and tools.
- Daily security reviews and Health and Safety tailgate meetings will be conducted.

4.8.4 PLS Survey

The Remedial Contractor will retain a New York State-licensed surveyor to provide initial benchmarks and stakeout for horizontal and vertical excavation limits (provided in Table 1). The Remedial Contractor will use this initial survey to confirm and maintain horizontal and vertical limits as the work proceeds. The New York State licensed surveyor will return as needed to document actual excavation work limits, measurement of unit cost bid items, and to complete an as-built survey of the finished work. The survey will be conducted under the oversight of the Engineer, and the findings reviewed and approved by the Engineer and National Grid.

The grid and benchmarks will be established in English Units (feet) in the following datum:

- **Horizontal:** New York State Plane Grid East as represented by NAD 1983; and
- **Vertical:** North American Vertical Datum 1988 (NAVD88).

Coordination with the surveyor will be the responsibility of the Remedial Contractor, and the surveyors will return as needed to establish other reference points, layout work, and collect as-built information such as the locations of documentation samples and the limits of the excavations. Other site personnel may perform additional intermediate surveys as needed.

4.8.5 Utility Location and Protection – Remedial Excavation Areas

Prior to excavation activities, Dig Safely NY will be contacted by the Remedial Contractor to complete a proper mark out of the site. If subsurface utilities are noted as being present, but the exact locations cannot be identified, the Remedial Contractor will be responsible for hiring a private utility locating firm to identify the locations of underground utilities prior to commencing intrusive activities.

There is only one known subsurface utility within the footprint of the remedial excavation area. This is the storm sewer line that connects a manhole at the intersection of Ingalls Avenue and President Street, with an outfall located on the shore of the Hudson River. The sewer is located between two of the identified excavation areas, and is therefore not anticipated to be replaced. The sewer line will be identified and protected for the duration of the remedial activities. The Remedial Contractor will be responsible for the sewer location and protection.

If a utility is encountered that has not been previously identified, the Remedial Contractor will promptly take the necessary steps to ensure that the utility is not damaged, and give

notice to the Construction Manager / Engineer. The Construction Manager / Engineer will review the conditions with National Grid and determine the extent, if any, that additional measures must be undertaken.

4.8.6 Erosion and Storm Water Controls

Erosion and storm water controls, including wattles, silt fence, or hay bales, will be installed by the Remedial Contractor prior to any disruption of the vegetative cover. The erosion controls will be maintained throughout the duration of the work. The erosion control measures will be installed to:

- Minimize the potential for erosion of site soil within, and adjacent to the remedial work areas.
- Minimize the potential for the migration of water containing sediments beyond the active remedial excavation areas.
- Minimize surface water run-on from off-site adjacent areas, including the sloped areas to the north and south.
- Minimize the accumulation of water in the active work areas.
- Reduce the potential for off-site tracking of site soils.

Storm water runoff from the exterior of the excavation area will be managed by the Remedial Contractor. Erosion and sediment control measures will be constructed and maintained according to the specifications of the document entitled “*New York State Standards and Specifications for Erosion and Sedimentation Control – Empire State Chapter of the Soil and Water Conservation Society*,” dated August 2005.

4.8.7 Site Clearing

It is not anticipated that extensive clearing will be necessary for this site. However, brush, trees, and other surface features that impede access to the excavation areas will be removed from the identified work areas. The Remedial Contractor will move the debris to an area on the City parcel that is outside of the identified remedial excavation areas.

4.8.8 Placement of Temporary Site Facilities

The following temporary facilities will be installed during remedial construction:

- Fuel storage and dispensing;
- Sanitary facilities;
- Health and safety equipment;
- Material laydown areas;

- Imported soil and topsoil stockpile areas for backfilling operations (if needed);
- Traffic control signage;
- Parking areas; and
- Project signage.

4.8.8.1 Decontamination Station

Decontamination stations will act as anti-tracking pads, to help remove soil from vehicles exiting the site onto public streets. Soil shall be transported in trucks or containers having measures to prevent seepage from transported material from leaking onto public streets. The Remedial Contractor will install and maintain the decontamination measures for the duration of the excavation work. During the mobilization phase, a decontamination/anti-tracking pad will be constructed adjacent to Ingalls Avenue. However, the final placement may be altered by the Remedial Contractor to accommodate their selected means and methods of construction.

4.8.9 Work Zones

Work zones will be established within the site boundaries in accordance with the site-specific HASP that define the initial Exclusion Zones, the Decontamination Zones, and the Support Zone. These zones will change as the work progresses in order to maintain safety and allow for practical completion of the work. The entire project will be designated as No Smoking. The HASP is included in Appendix C.

4.8.10 Community Air Monitoring

The equipment and labor necessary to implement the CAMP will be mobilized and set up at the site prior to any invasive field activities. Excavation activities at remediation sites typically generate airborne dust and odors 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 volatile organic compounds (VOCs) that are protective of the surrounding community. The requirements of the CAMP are contained in Appendix 1A of the DER-10 Document. The CAMP is intended to supplement, but be discrete from the air-monitoring program implemented by the Remedial Contractor for purposes of evaluating site worker health and safety.

A site-specific CAMP is included in Appendix B. It is designed to provide monitoring procedures, Alert Limits, Action Limits, and contingency measures if Action Limits are approached as the invasive work is completed.

- **Alert Limit:** An Alert Limit is a contaminant concentration or odor intensity that triggers contingent measures. An Alert Limit does not suggest the existence of a health hazard, but serves instead as a screening tool to trigger contingent measures, if

necessary, to assist in minimizing off-site transport of COC and odors during remedial activities.

- **Action Limit:** An Action Limit is a contaminant concentration or odor intensity that triggers work stoppage.

If the real-time Action Limits are exceeded, or significant nuisance odors are noted, National Grid, the Engineer, and the Remedial Contractor will consult to discuss appropriate types of emission control actions. 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 impacted soils, or stockpiles of impacted soils with tarpaulins, vapor suppressing foam, or other vapor control agent(s).
- Temporarily relocating work to an area with potentially lower emission levels.
- Reduce the production rate or change the sequence of work activities.
- Change the work 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 exclusion zone perimeter at each of the four identified remedial areas in the first instance. The anticipated locations of the air monitoring stations are also noted, subject to change according to the Remedial Contractor's means and methods.

4.8.11 Odor and Fugitive Dust Control

Volatile emissions and dust and odors will be controlled from the soil excavation activities to limit the potential for off-site impacts. The Remedial Contractor will provide odor suppressant system consisting of chemical foam (e.g., Rusmar Foam™) or other approved method. The Remedial Contractor will keep sufficient odor suppressant on-site to manage the odors generated from the excavated materials, including, but not limited to open excavations, limited stockpiles, or materials loaded into trucks for transportation and disposal. The odor suppressant system will be stored near the excavation and will be easily mobile. Open excavations containing MGP-related source material will be backfilled or covered at the end of each working day to suppress odors.

4.8.12 Soil Excavation

The excavation will be performed using standard construction equipment, including backhoes, hydraulic excavators, front end loaders, and skid-steer loaders (e.g. Bobcats) for excavation, stockpiling, and loading. Temporary excavation support (e.g. trench-boxes) will

be employed for the deeper excavations. The need for temporary excavation support will be governed by the applicable OSHA regulations. Selection of the temporary support methods will be performed by the Remedial Contractor.

The Remedial Contractor will be required to remove debris and impacted soil to the depths identified in this work plan. Based on these dimensions and the footprint and depths specified, approximately 270 cubic yards of soil will be removed from the excavation areas. Excavated soil and debris may be directly loaded into trucks, or into roll-off containers, or may be stockpiled on-site for subsequent sampling and disposal. Prior to backfilling, a visual demarcation barrier will be installed at the bottom of the excavation to indicate the vertical limit of excavation.

4.8.13 Soil Sampling for Confirmation

After the excavation in each of the five identified remedial areas is completed, excavation sampling will be performed for confirmation purposes. Samples will be collected by the Engineer, with support from the Remedial Contractor. Sample collection frequency will be a minimum of one (1) sidewall sample for every 30 linear feet of sidewall, and a minimum of one (1) bottom sample for every 900 square feet of excavation, in accordance with the NYSDEC DER-10. Because it is anticipated that each of the five remedial areas will be less than 900 square feet, it is anticipated that five samples will be collected from each remedial area (four sidewall samples and one bottom sample). Where NYSDEC determines such sampling will not be representative of conditions in the excavation in which case NYSDEC may request additional sidewall and/or bottom samples for documentation.

The soil samples collected for documentation will be analyzed for free cyanide EPA Method 9016, and total cyanide EPA Method 9014. The samples will be analyzed by a NYS ELAP-certified laboratory. The analytical results from all samples collected will be validated, and a DUSR prepared. The results of the confirmation sampling will be provided to the NYSDEC in the final report.

4.8.14 Excavation Dewatering

Each of the excavated areas will remove soil from above the elevation of the groundwater table. Therefore, excavation dewatering is not anticipated to be needed for the RA.

4.8.15 Restoration

A demarcation barrier will be placed at the bottom and sidewalls of each of the excavations. Restoration will then include backfilling of the excavations with imported soil meeting DER-10, Appendix 5 requirements. The final ground surface elevation of the excavated areas will be approximately the same as the grade prior to remedial excavation. The surface of the disturbed areas will be restored using ordinary fill that conforms to general requirements for material designation 733-10 in the September 4, 2014 Standard Specification prepared by the

New York State Department of Transportation, the fill will have a pH greater than 5, and less than 10. Ordinary Fill shall be comprised of hard, durable sand and gravel, free of clay, organic matter, surface coatings, trash, debris, and other deleterious materials. Soil finer than the No. 200 sieve (the “fines”) should be non-plastic. Ordinary fill shall meet the following gradation 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

4.8.16 Waste Management

4.8.16.1 On-Site Waste Management

On-site storage will take place in accordance with applicable laws and regulations dealing with the type of waste being stored. Liquid wastes will be stored in appropriate tanks or drums. Solid waste materials (soil and fill) will be stored in covered stockpiles or roll-off containers.

4.8.16.2 Dewatering Effluent and Decontamination Water

Effluent associated with excavation dewatering or decontamination activities will be pumped into a bulk storage tank located outside of the excavation areas. The tank will be sufficiently sized to contain the wastewater and provide some measure of primary treatment (settling). Decontamination water will then be disposed of off-site following profiling by National Grid’s waste vendor. The disposal information will be included in the final report.

4.8.16.3 Storm Water Runoff Control

The excavation areas are within a vacant area, and storm water is currently managed by infiltration or surface runoff to the Hudson River. During work for the RA, the control and diversion of storm water runoff is important to reduce the potential for water to accumulate in the remedial excavations.

Storm water contact with the impacted soils will be limited due to site grading or localized erosion and sediment control around the area of excavation. Therefore, it is not anticipated that surface runoff will enter into the excavation areas. The Remedial Contractor will be required to utilize appropriate control measures to direct runoff away from the excavation areas. Storm water runoff control measures may include the installation of berms and barriers.

4.8.16.4 Decontamination

The objectives of the decontamination activities are to provide the equipment necessary to decontaminate personnel and equipment to prevent cross-contamination from the excavation area to public areas (i.e., highways, roads, support trailer, vehicles, etc.).

Decontamination Procedures

The Remedial Contractor will establish decontamination areas for the following activities:

- Personnel decontamination
- Equipment decontamination

Personnel Decontamination Station

A personnel decontamination station where workers can drop equipment and remove personal protective equipment (PPE) will be set up within the work zone. It 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.

Equipment Decontamination Station

Heavy equipment decontamination will be performed within the limits of the on-site decontamination pads. Heavy contamination will be brushed 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.

Decontamination/anti-tracking pads will be located where equipment leaves the site. The pad(s) will be sufficiently sized to ensure that the largest piece of equipment can be adequately decontaminated.

If necessary, effluent from equipment decontamination will be collected and pumped into a bulk tank. Disposal of the wastewater will be handled by National Grid's waste vendor. Soils collected from the decontamination pads will be bulked with the excavated material and sent to the properly licensed National Grid-approved disposal facility.

4.8.16.5 Material Transport Vehicle Decontamination

Trucks transporting soil off-site will enter the excavation area as shown on Figure 14. Care will be exercised when loading trucks so as not to spill material on the outside of the trucks. Upon exiting the excavation area, the Remedial Contractor will stage the trucks on the

equipment decontamination/anti-tracking pad. Trucks will then be visually inspected (i.e., box sidewalls, tailgate, and tires) and brushed off, if necessary, to remove visual soil particles. Trucks or roll-off containers must be equipped with solid sealable covers and the use of mesh roll top covers will not be allowed.

Decontamination Equipment

The Remedial Contractor will be responsible for maintaining a sufficient supply of materials/equipment as required to implement decontamination procedures.

4.8.16.6 Waste Disposal Characterization

A preliminary plan for profiling and characterization for disposal is described below. However, to ensure that the most current requirements of the targeted disposal facilities are met prior to mobilization, the analyses will need to be updated and confirmed with the facilities before mobilization for sample collection. Profiling and characterization activities is the responsibility of the Remedial Contractor.

Landfill Facilities

Excavated materials that may be disposed of at a landfill facility will be characterized following excavation. Three National Grid-approved facilities are discussed below. However, the final list of potential facilities will need to be confirmed prior to remediation. The target facilities currently considered for landfill disposal include:

- Colonie Landfill, Cohoes, New York
- Ontario County Landfill, Stanley, New York
- Seneca Meadows Landfill, Waterloo, New York

To meet the sample requirements of these facilities, the pre-characterization samples will be analyzed for the following:

- Toxicity Characteristic Leaching Procedure (TCLP) ZHE Extraction – U.S. EPA Method 1311;
- TCLP VOC – U.S. EPA Method 1311/8260B;
- TCLP Semi-Volatile Organic Compound (SVOC) – U.S. EPA Method 1311/8270C;
- TCLP Inductively Coupled Plasma (ICP) Metals – U.S. EPA Method 6010B;
- TCLP Herbicides – U.S. EPA Method 1311/8151A;
- TCLP Pesticides – U.S. EPA Method 1311/8081A;
- TPH – U.S. EPA 8015 GRO/DRO;

- VOC Target Compound List (TCL) – U.S. EPA Method 8260C;
- SVOC TCL – U.S. EPA Method 8270D;
- Total Cyanide – U.S. EPA Method 9014A;
- Polychlorinated Biphenyl (PCB) – U.S. EPA Method 8082;
- Reactive Sulfide – U.S. EPA Method 7.3.4.1;
- Reactive Cyanide – U.S. EPA Method 7.3.3.2;
- Ignitability – U.S. EPA Method 1010/Flashpoint;
- Corrosivity / pH – U.S. EPA Method 9045;
- BTU/Heat of Combustion – ASTM D240 -09 Standard;
- % Sulfur – U.S. EPA D129-64 91;
- Total Residue/Percent Solids – U.S. EPA D-2216-90; and
- RCRA 8 Total Metals – U.S. EPA 6000-7000 Series (arsenic, mercury, silver, selenium, lead, chromium, barium, and cadmium).

The number of samples required for characterization and profiling will be confirmed with the facilities prior to mobilization. For the sample analysis, a NYSDOH ELAP-certified laboratory will be utilized. Level II reports will be prepared for the sample delivery groups. The chain-of-custody record and the laboratory Form I Report sheets for the analyses will be provided to the Remedial Contractor and the target disposal facilities. The analytical results will also be included in the final report by the Engineer.

4.8.16.7 Off-Site Transportation and Disposal

The Remedial Contractor will coordinate the transportation and disposal of the excavated material with the designated receiving facilities. Excavated materials will be transported by a NYS permitted waste hauler to the receiving facilities. Transportation of impacted materials will be performed in accordance with all NYSDEC and New York State Department of Transportation (NYSDOT) regulatory requirements for hazardous/non-hazardous materials/waste. Trucks will be checked for loose soil or other materials and odors before leaving the site. Loose soil or other materials will be removed prior to departure.

Non-hazardous waste shipments will be documented using standard waste manifests as required by applicable NYSDEC and NYSDOT waste regulations. Other waste materials that have no specific documentation requirements will be documented using waste tracking forms, bills of lading, and receipts. Each waste shipment will be documented, and will include a description of the type and amount of waste being transported and the name and location of the receiving facility. National Grid or National Grid's designated representative

will sign the manifests. Off-site trucking will generally follow the haul route shown on Figure 14.

4.8.16.8 Record Keeping

Copies of manifests and/or bills of lading for all shipments will be submitted to the Construction Manager/Engineer prior to the loaded vehicle departing the site. A log of waste shipments and copies of manifests and/or bills of lading will be maintained by the Construction Manager/Engineer on site. Upon completion of the RA, the Engineer will provide National Grid with logs, manifests and/or bills of lading. Copies of the logs, manifests, and bills of lading will be included in the RA Report following completion of the RA to create a permanent record of disposal.

5. Reporting

5.1 Daily Reports

GEI will prepare a daily report to document the RA activities. The routine reports will be provided to the NYSDEC Project Manager, according to the reporting guidelines provided in the DER-10 document. The reports will typically include the following information:

- A summary of the accomplishments and findings of each day's work in the field.
- Photos showing the applicable work activities for that day.

5.2 RA Final Report

GEI will prepare a RA Final Report at the conclusion of the field activities in accordance with DER-10, Section 5.8. The following items will be included:

- A description of all field work performed.
- A photographic record of the field activities.
- A summary of the CAMP results, including any exceedances and corrective actions.
- A description of changes made to the scope of work for the RA.
- A summary of the quantity of soil removed during the RA.
- A summary of the quality of backfill soil used.
- Figures showing the "as-built" limits of the excavation.
- A description of the site restoration activities.
- Documentation presenting information regarding the off-site transportation of water, and disposal facility receipts.
- Documentation presenting information regarding the off-site transportation of soil and the disposal facility receipts.
- Copies of all pertinent analytical results, testing records, weigh tickets, bills of lading, and manifests for the disposal of materials.

The RA Final Report will be certified by a professional engineer licensed in the State of New York.

6. Schedule

The RA is planned for a construction period mutually acceptable to National Grid, the City of Troy, and the NYSDEC. The work is expected to commence in the winter of 2018 and be completed by March 31, 2018. A more detailed schedule will be submitted to the NYSDEC, following approval of this work plan and the selection of the Remedial Contractor.

7. References

Foster Wheeler, 1998. Waste Characterization Report for the Ingalls Avenue Site, Troy, New York, dated December 1998.

Foster Wheeler, 1999. Draft Waste Removal Report for the Niagara Mohawk Power Corporation Ingalls Avenue Site, Troy, New York, dated August 1999.

Foster Wheeler, 2001. Letter Report to Niagara Mohawk on the Analytical Data for Troy Ingalls Avenue Operable Unit, dated November 16, 2001.

GEI, 2016. Pre-Design Investigation Work Plan, OU2 Ingalls Avenue Area, Troy (Smith Avenue) Former MGP site, Troy, New York, NYSDEC Site # 442030,” dated November 9, 2016.

GEI, 2017. Pre-Design Investigation Report, OU2 Ingalls Avenue Area, Troy (Smith Avenue) Former MGP Site, Troy, New York, August 2017.

H2H, 2010. Environmental Site Investigation Report, Future Ingalls Park Site, Troy, New York, dated October 2009, revised January 2010.

NYSDEC, 2006. NYSDEC Rules and Regulations, 6 NYCRR Subpart 375-6, Remedial Program Soil Cleanup Objectives, dated December 14, 2006.

NYSDEC, 2010. DER-10 – Technical Guidance for Site Investigation and Remediation, May 2010.

NYSDEC, 2011. Record of Decision (ROD) for the NM - Troy Smith Ave. MGP Operable Unit Numbers: 02, 03, March 2011.

Tetra Tech, 2003. Draft Site Investigation Report, Niagara Mohawk a National Grid Company, Ingalls Operable Unit, Troy, New York, dated November 18, 2003.

Tetra Tech, 2007. Supplemental Investigation Summary Report, National Grid Troy (Smith Ave.) Ingalls Ave. Former MGP Site, Troy, New York, dated January 31, 2007.

Tetra Tech, 2010. Special Environmental Conditions, Ingalls Avenue Boat Launch Project, Ingalls Avenue Site, Inactive Hazardous Waste Site #4-42-030, Operable Unit 2, City of Troy, Rensselaer County, dated October 2010.

Tables

Table 1
Soil Volume Estimates and Remedial Excavation Coordinates
OU2 Ingalls Avenue Area - Troy (Smith Avenue) Non-Owned Former MGP Site
Remedial Action Work Plan

Area A Excavation Volume				
Area ID	Area (sf)	SCO	Avg Depth (ft bgs)	Volume CY
Area A	760	Note 1	4.0	113
Volume			113	CY
Excavation Area A Coordinates				
Location	Northing		Easting	
A1	1426918.16		711076.93	
A2	1426918.16		711100.00	
A3	1426908.17		711114.79	
A4	1426898.17		711114.79	
A5	1426898.17		711076.93	

Area B Excavation Volume				
Area ID	Area (sf)	SCO	Avg Depth (ft bgs)	Volume CY
Area B	49	Note 1	9.0	16
Volume			16	CY
Excavation Area B Coordinates				
Location	Northing		Easting	
B1	1426835.22		711119.80	
B2	1426829.47		711121.52	
B3	1426836.94		711125.55	
B4	1426831.19		711127.27	

Table 1
Soil Volume Estimates and Remedial Excavation Coordinates
OU2 Ingalls Avenue Area - Troy (Smith Avenue) Non-Owned Former MGP Site
Remedial Action Work Plan

Area C Excavation Volume				
Area ID	Area (sf)	SCO	Avg Depth (ft bgs)	Volume CY
Area C	250	Note 1	6.0	56
Volume				56 CY
Excavation Area C Coordinates				
Location	Northing	Easting		
C1A	1426865.83	711152.68		
C1B	1426866.81	711172.66		
C1C	1426859.84	711152.98		
C1D	1426860.81	711172.95		
C2A	1426851.33	711163.40		
C2B	1426851.82	711173.39		

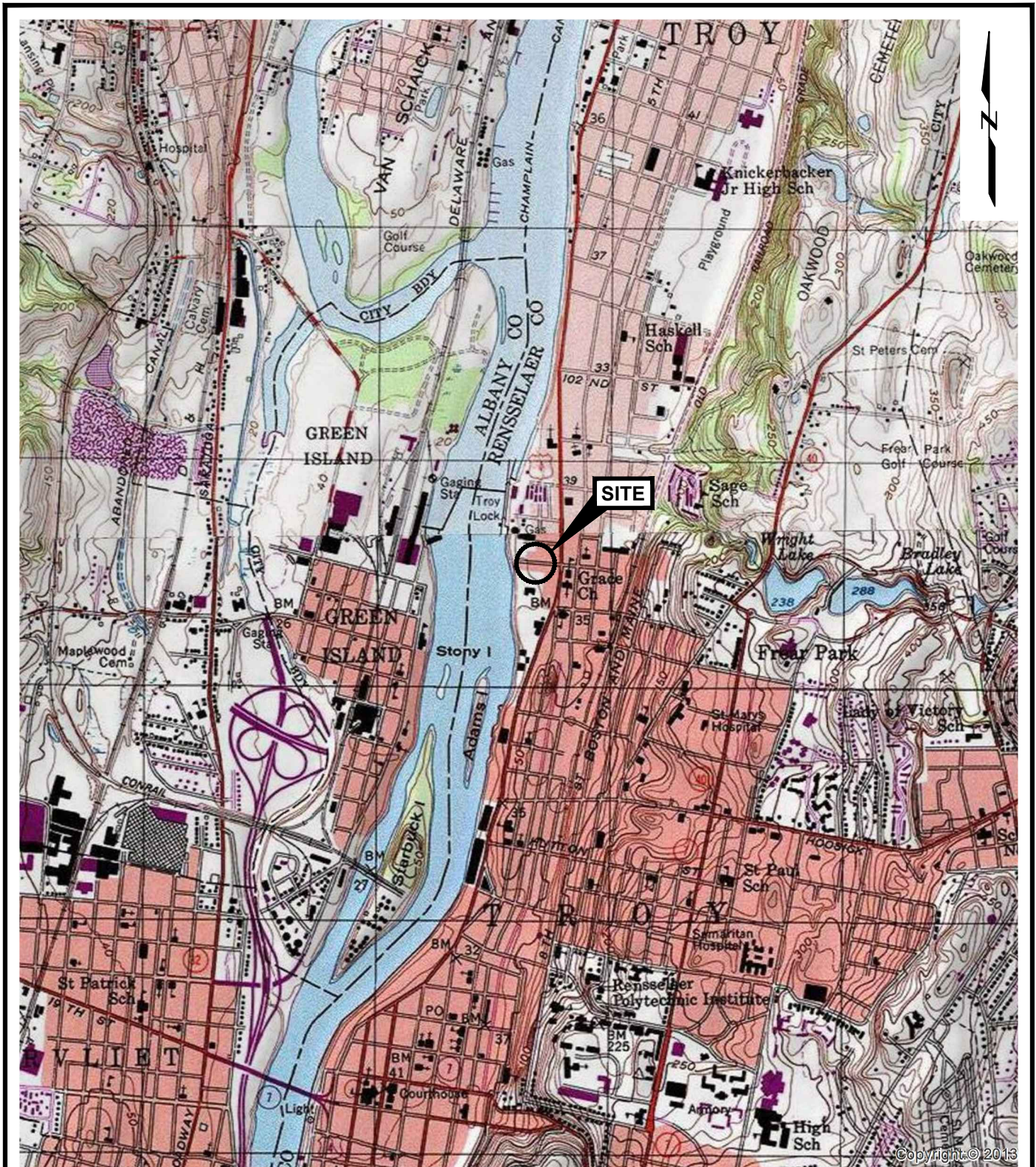
Area D Excavation Volume				
Area ID	Area (sf)	SCO	Avg Depth (ft bgs)	Volume CY
Area D	140	Note 1	10.5	54
Volume				54 CY
Excavation Area D Coordinates				
Location	Northing	Easting		
D1	1426947.60	711098.52		
D2	1426946.76	711118.50		
D3	1426941.63	711098.27		
D4	1426940.78	711118.25		

Table 1
Soil Volume Estimates and Remedial Excavation Coordinates
OU2 Ingalls Avenue Area - Troy (Smith Avenue) Non-Owned Former MGP Site
Remedial Action Work Plan

Area E Excavation Volume				
Area ID	Area (sf)	SCO	Avg Depth (ft bgs)	Volume CY
Area E	824	Note 1	1	31
Volume				31 CY
Area E Excavation Coordinates				
Location	Northing	Easting		
E1	1426922.79	711104.23		
E2	1426921.59	711121.92		
E3	1426911.30	711129.67		
E4	1426904.68	711151.99		
E5	1426891.6	711147.52		
E6	1426892.98	711126.99		
E7	1426905.24	711108.36		
Total Estimated Excavation Volume				269 CY

Note 1: SCO for OU2 is 27 mg/kg free cyanide and 72 mg/kg total cyanide
CY - cubic yards

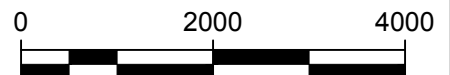
Figures



Copyright © 2013

SOURCE:

USA Topo Maps Layer Obtained from ArcGIS Online, Copyright:© 2013
National Geographic Society, i-cubed.



SCALE: 1" = 2000'

Remedial Action Work Plan
Ingalls Avenue Area - OU2
Troy Smith Avenue Former MGP Site
Troy, New York

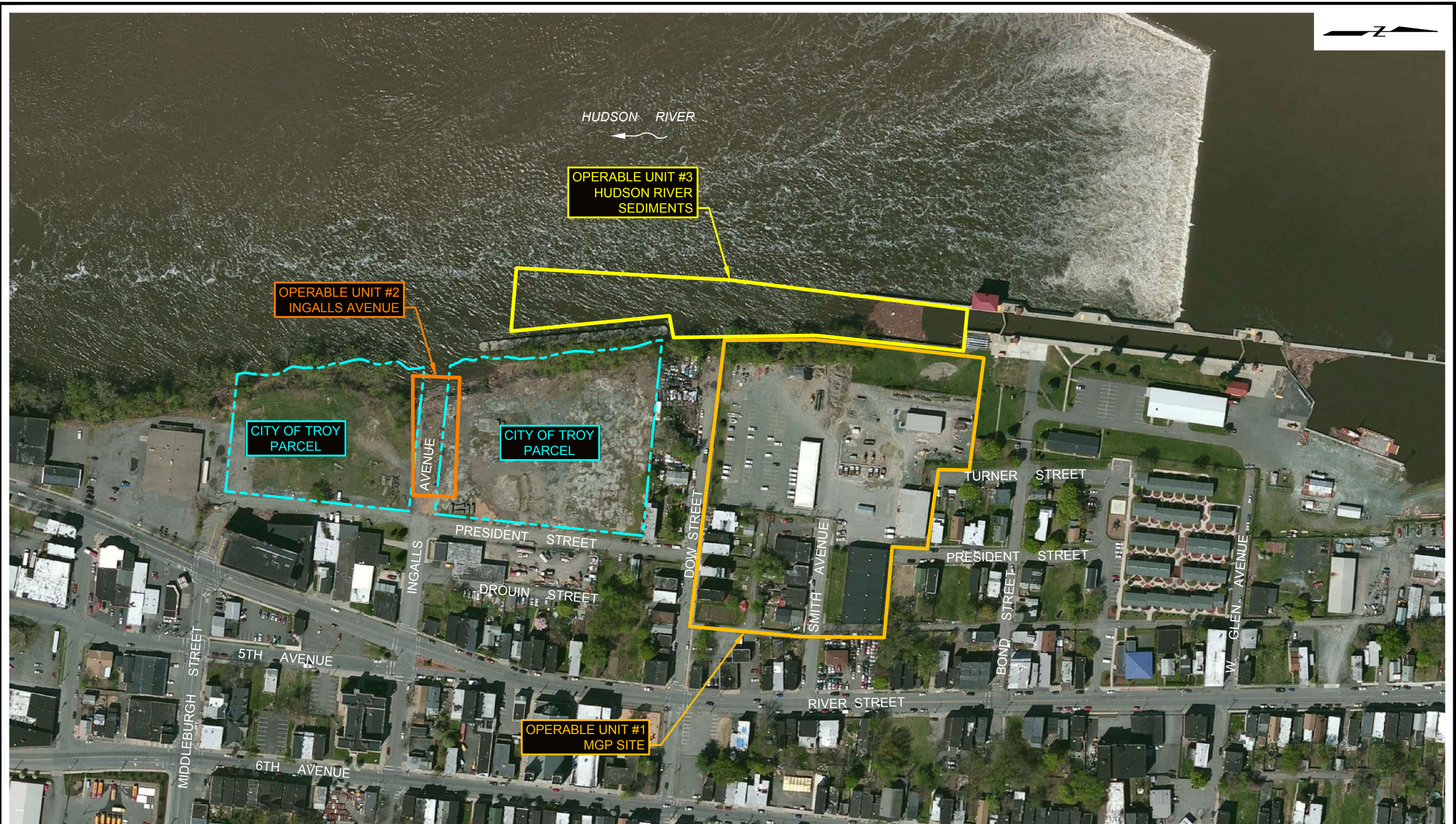


SITE LOCATION MAP

Project 116830

January 2018

Fig. 1



SOURCES:

1. Aerial Photograph From Bing Maps, Accessed Via ArcGIS Online © 2010 Microsoft Corporation and its Data Suppliers, Accessed on 8/16/2016.
2. Figure 2: Site Plan from OU-3 Basis of Design Report, Troy - Smith Avenue Former MGP Site, Prepared by GEI Consultants, Date: May 2013.



Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

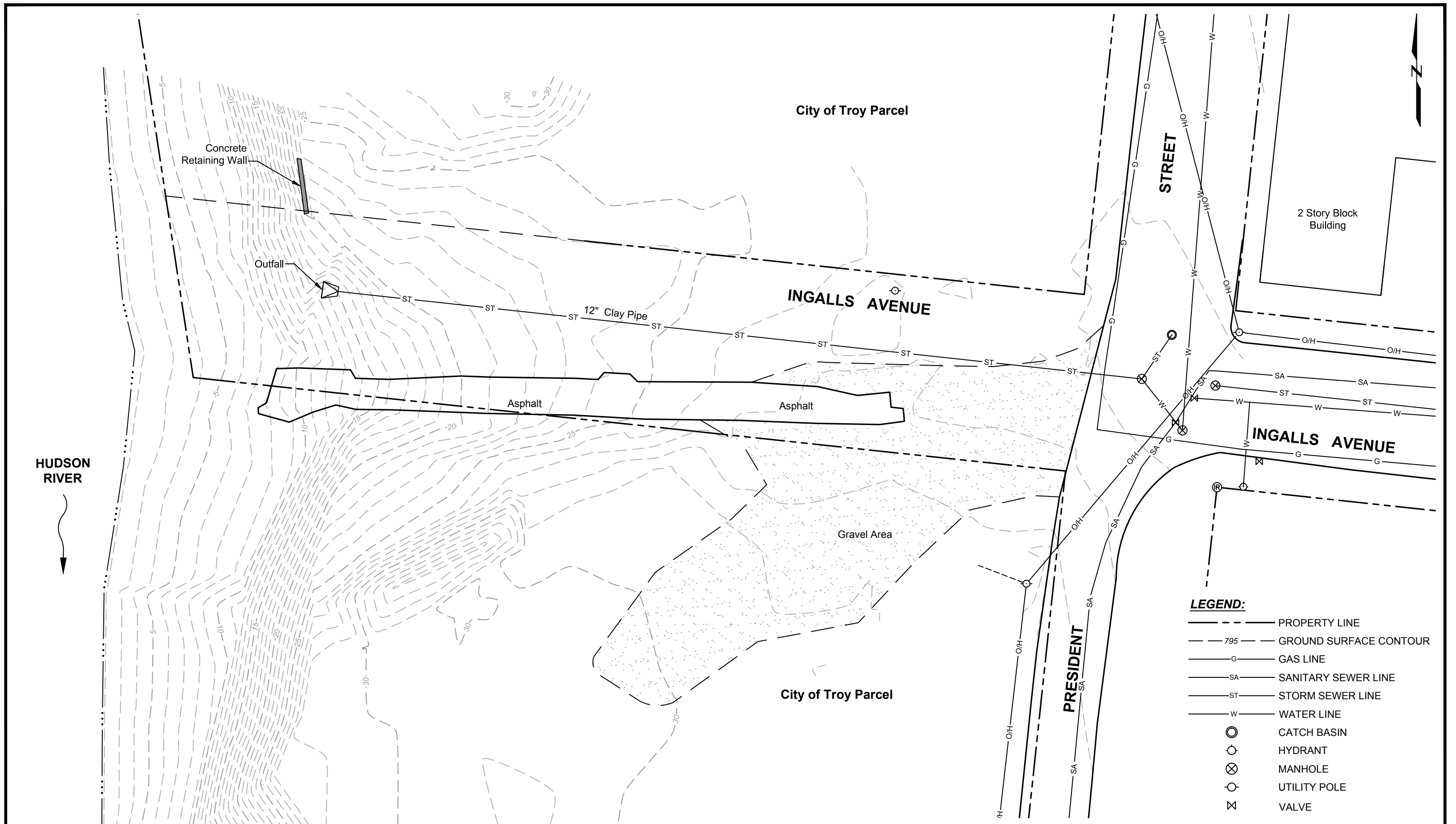


SITE LAYOUT AND
 OPERABLE UNITS

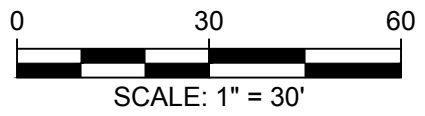
Project 116830

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Fig. 2



SOURCE:
 Plan Based On Map Titled Former Mgp Site, Ingalls Avenue & President Street,
 City Of Troy - Rensselaer County, State Of New York, Prepared By Delta
 Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.



Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

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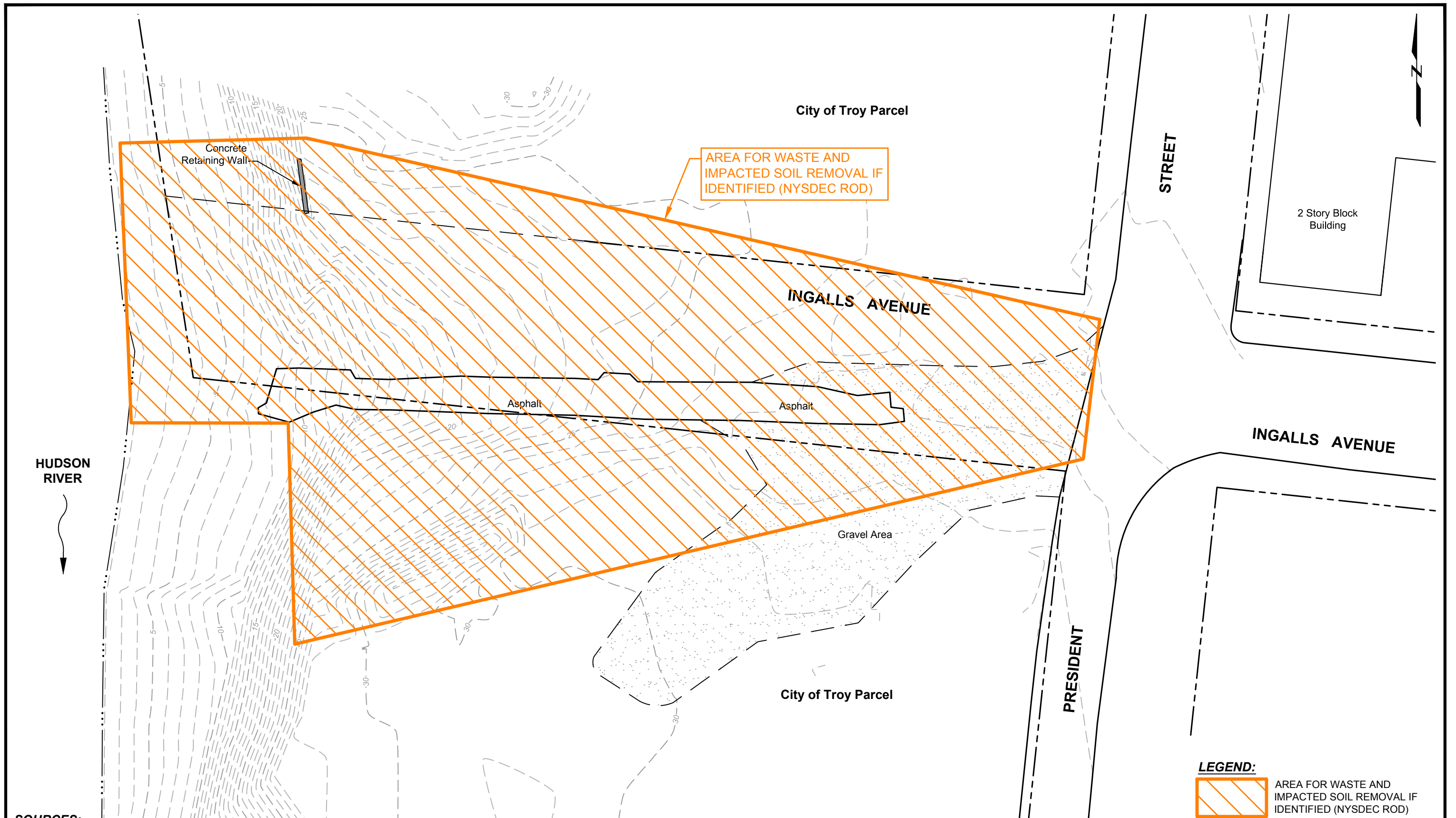
GEI Consultants

Project 116830

SITE PLAN
 CURRENT FEATURES
 AND UTILITIES

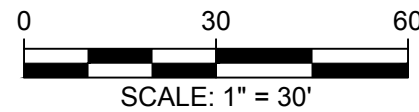
January 2018

Fig. 3




SOURCES:

1. Plan Based On Map Titled *Former MGP Site, Ingalls Avenue & President Street, City Of Troy - Rensselaer County, State Of New York*, Prepared By Delta Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.
2. Figure 6: Troy (Smith Ave) Ingalls Avenue (OU2) Alternative 3 from *Record of Decision, NM - Troy Smith Ave. MGP, Operable Unit Numbers 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030*, Prepared by Tetra Tech EC, Inc., Date: March 2011.



LEGEND:

-  AREA FOR WASTE AND IMPACTED SOIL REMOVAL IF IDENTIFIED (NYSDEC ROD)

Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

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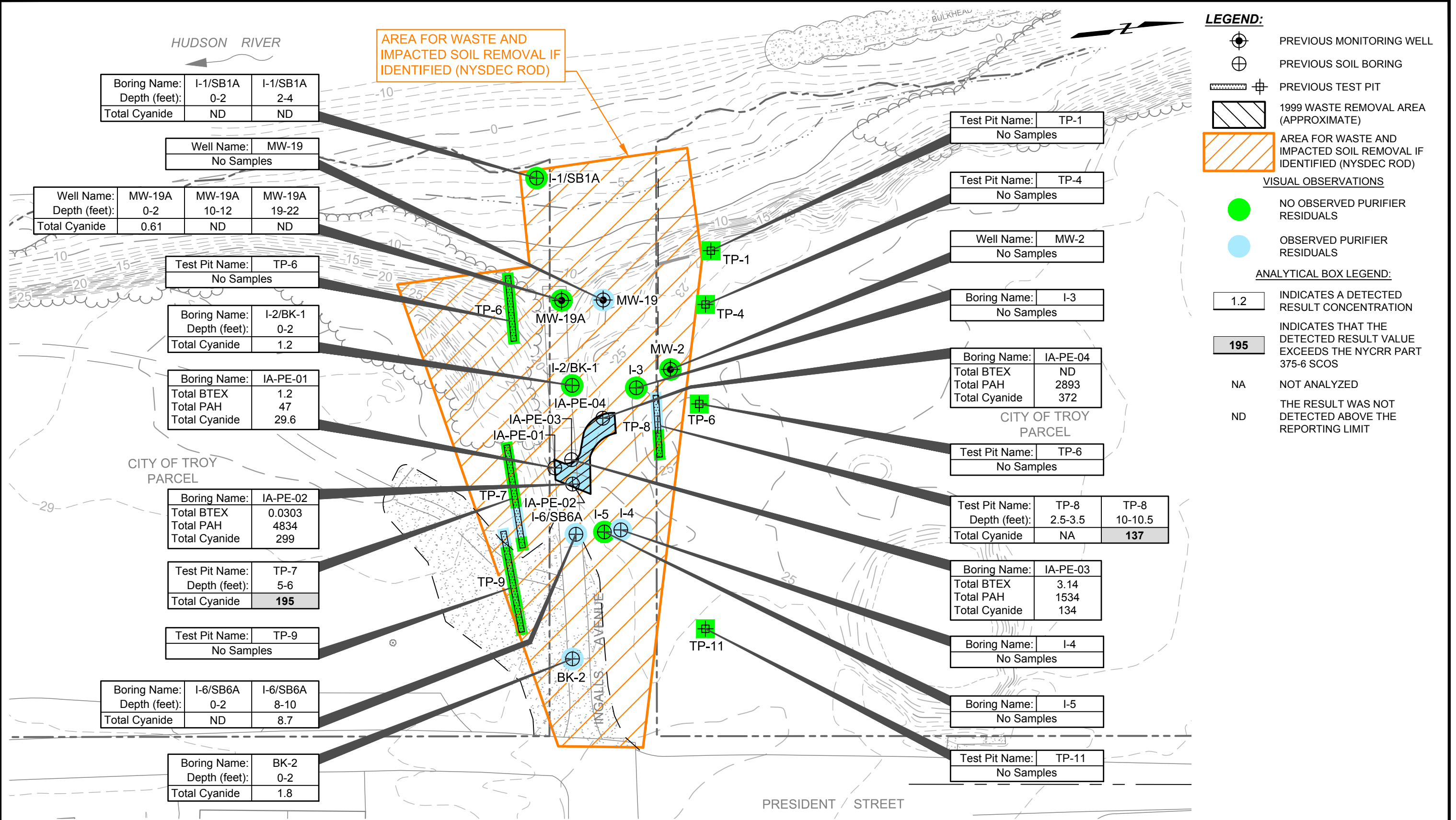


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SITE PLAN AND OU2
 REMEDIAL
 EXCAVATION AREA

January 2018

Fig. 4



SOURCES:

- AutoCAD Base drawing by F.J Bossolini obtained from the City of Troy, New York, 2016.
- Figures 3 & 6 from Record of Decision, NM - Troy Smith Ave. MGP, Operable Unit Numbers 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030, Prepared by Tetra Tech EC, Inc., Date: March 2011.

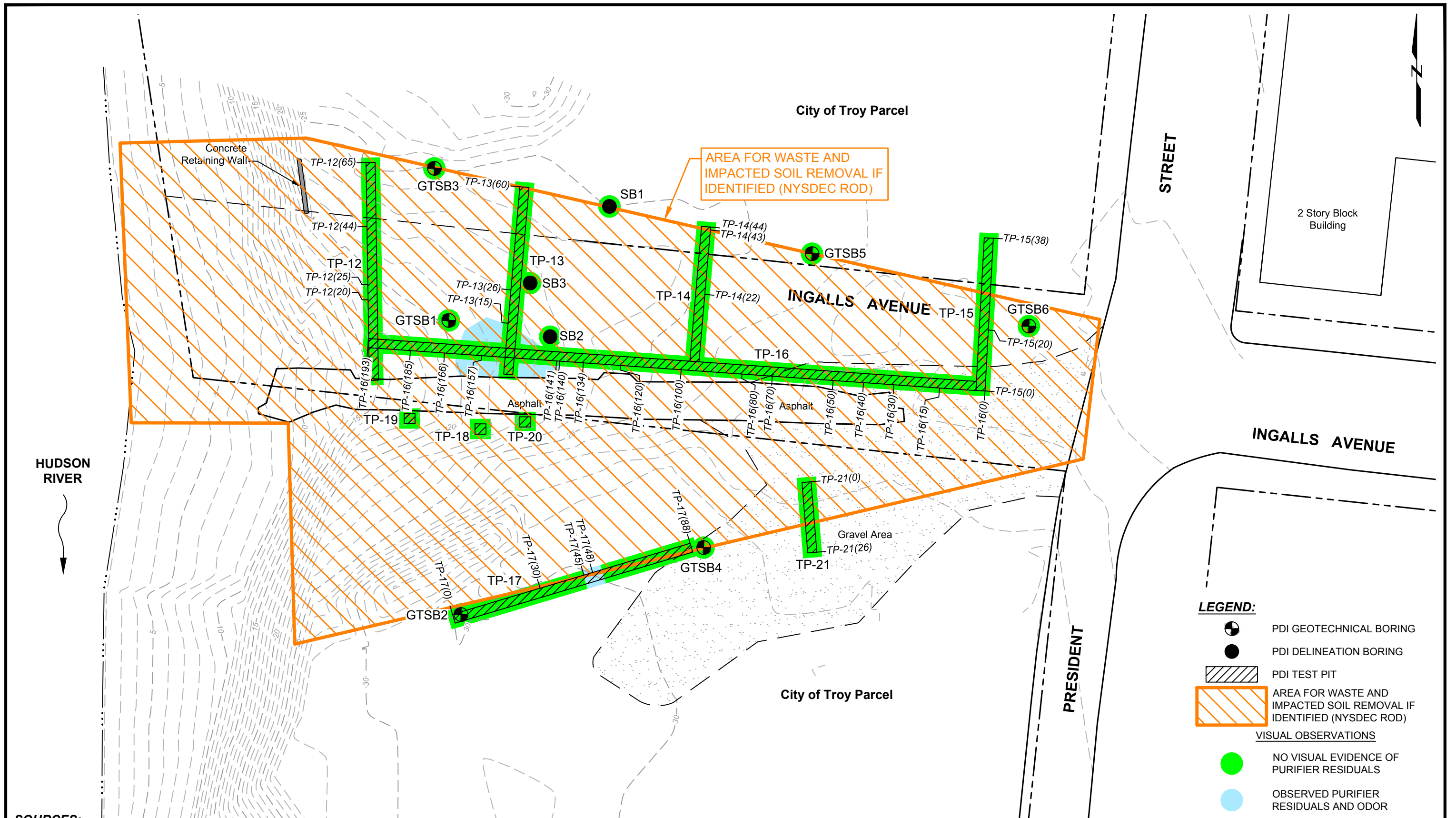
Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

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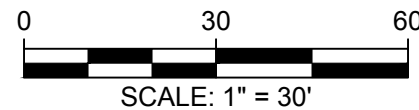
PRE-PDI EXPLORATION
 LOCATIONS AND RESULTS
 AND 1999 REMEDIAL AREA

Project 116830 | January 2018 | Fig. 5



SOURCES:

1. Plan Based On Map Titled *Former MGP Site, Ingalls Avenue & President Street, City Of Troy - Rensselaer County, State Of New York*, Prepared By Delta Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.
2. Figures 3 & 6 from *Record of Decision, NM - Troy Smith Ave. MGP, Operable Unit Numbers 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030*, Prepared by Tetra Tech EC, Inc., Date: March 2011.



Remedial Action Work Plan
Ingalls Avenue Area - OU2
Troy Smith Avenue Former MGP Site
Troy, New York

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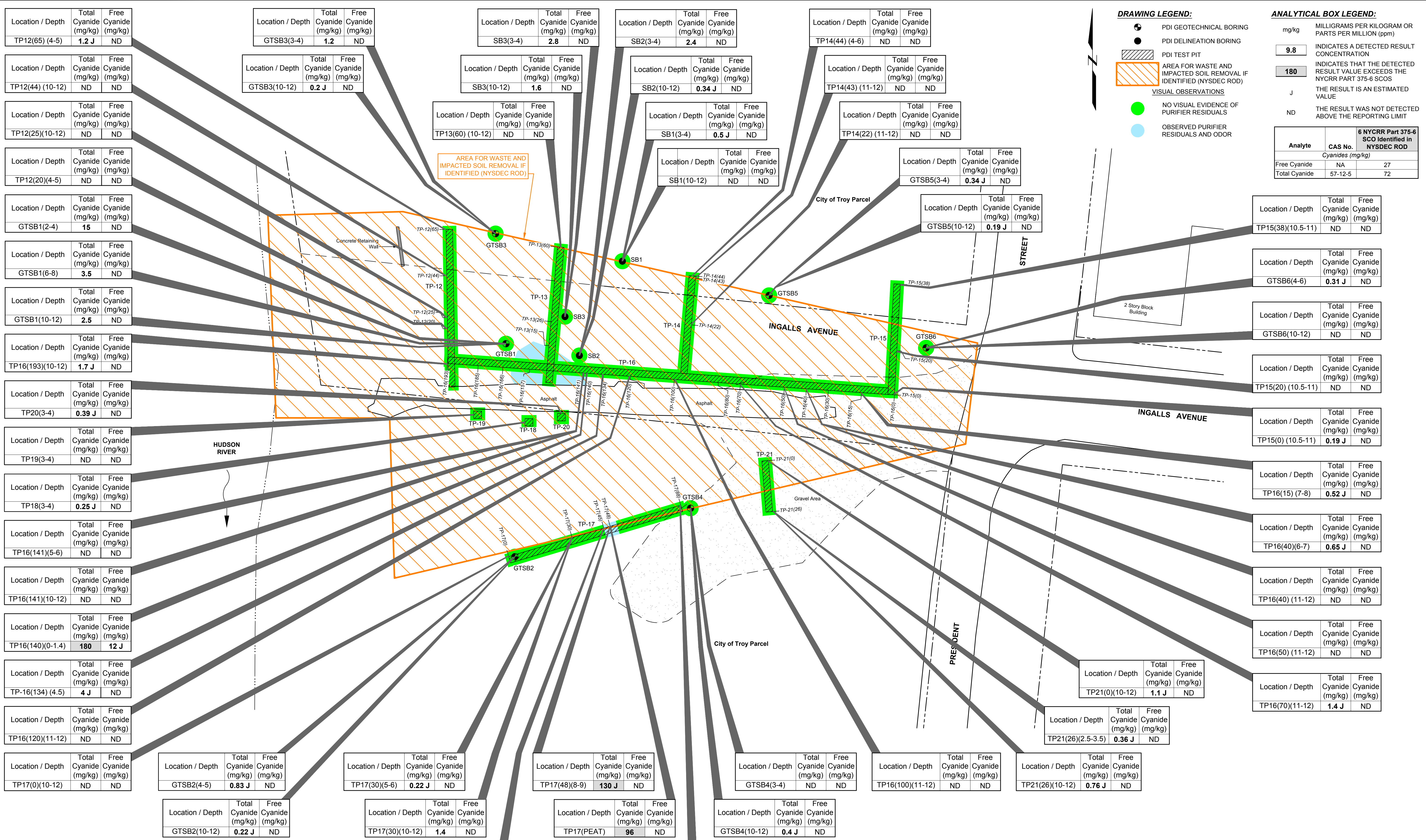


2017 PDI EXPLORATION
LOCATIONS AND
OBSERVATION SUMMARY

Project 116830

January 2018

Fig. 6



DRAWING LEGEND:

- PDI GEOTECHNICAL BORING
- PDI DELINEATION BORING
- PDI TEST PIT
- AREA FOR WASTE AND IMPACTED SOIL REMOVAL IF IDENTIFIED (NYSDEC ROD)
- VISUAL OBSERVATIONS
- NO VISUAL EVIDENCE OF PURIFIER RESIDUALS
- OBSERVED PURIFIER RESIDUALS AND ODOR

ANALYTICAL BOX LEGEND:

- mg/kg MILLIGRAMS PER KILOGRAM OR PARTS PER MILLION (ppm)
- 9.8** INDICATES A DETECTED RESULT CONCENTRATION
- 180** INDICATES THAT THE DETECTED RESULT VALUE EXCEEDS THE NYCRR PART 375-6 SCOS
- J THE RESULT IS AN ESTIMATED VALUE
- ND THE RESULT WAS NOT DETECTED ABOVE THE REPORTING LIMIT

Analyte	CAS No.	6 NYCRR Part 375-6 SCO Identified in NYSDEC ROD
Free Cyanide	NA	27
Total Cyanide	57-12-5	72

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP12(65) (4-5)	1.2 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB3(3-4)	1.2	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
SB3(3-4)	2.8	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
SB2(3-4)	2.4	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP14(44) (4-6)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP12(44) (10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB3(10-12)	0.2 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
SB3(10-12)	1.6	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
SB2(10-12)	0.34 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP14(43) (11-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP12(25)(10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP13(60) (10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
SB1(3-4)	0.5 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP14(22) (11-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP12(20)(4-5)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
SB1(10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB5(3-4)	0.34 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB1(2-4)	15	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB5(10-12)	0.19 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP15(38)(10.5-11)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB1(6-8)	3.5	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB6(4-6)	0.31 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB1(10-12)	2.5	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB6(10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(193)(10-12)	1.7 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP15(20) (10.5-11)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP20(3-4)	0.39 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP15(0) (10.5-11)	0.19 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP19(3-4)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(15) (7-8)	0.52 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP18(3-4)	0.25 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(40)(6-7)	0.65 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(141)(5-6)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(40) (11-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(141)(10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(50) (11-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(140)(0-1.4)	180	12 J

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP21(0)(10-12)	1.1 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(70)(11-12)	1.4 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP-16(134) (4.5)	4 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP21(26)(2.5-3.5)	0.36 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(120)(11-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB2(4-5)	0.83 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(30)(5-6)	0.22 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(48)(8-9)	130 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB4(3-4)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(100)(11-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(0)(10-12)	ND	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB2(10-12)	0.22 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(30)(10-12)	1.4	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(PEAT)	96	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
GTSB4(10-12)	0.4 J	ND

SOURCE:
 PLAN BASED ON MAP TITLED FORMER MGP SITE, INGALLS AVENUE & PRESIDENT STREET, CITY OF TROY - RENSSELAER COUNTY, STATE OF NEW YORK, PREPARED BY DELTA ENGINEERS, ARCHITECTS & LAND SURVEYORS, SCALE 1" = 20', DATE: MAY 18, 2017.



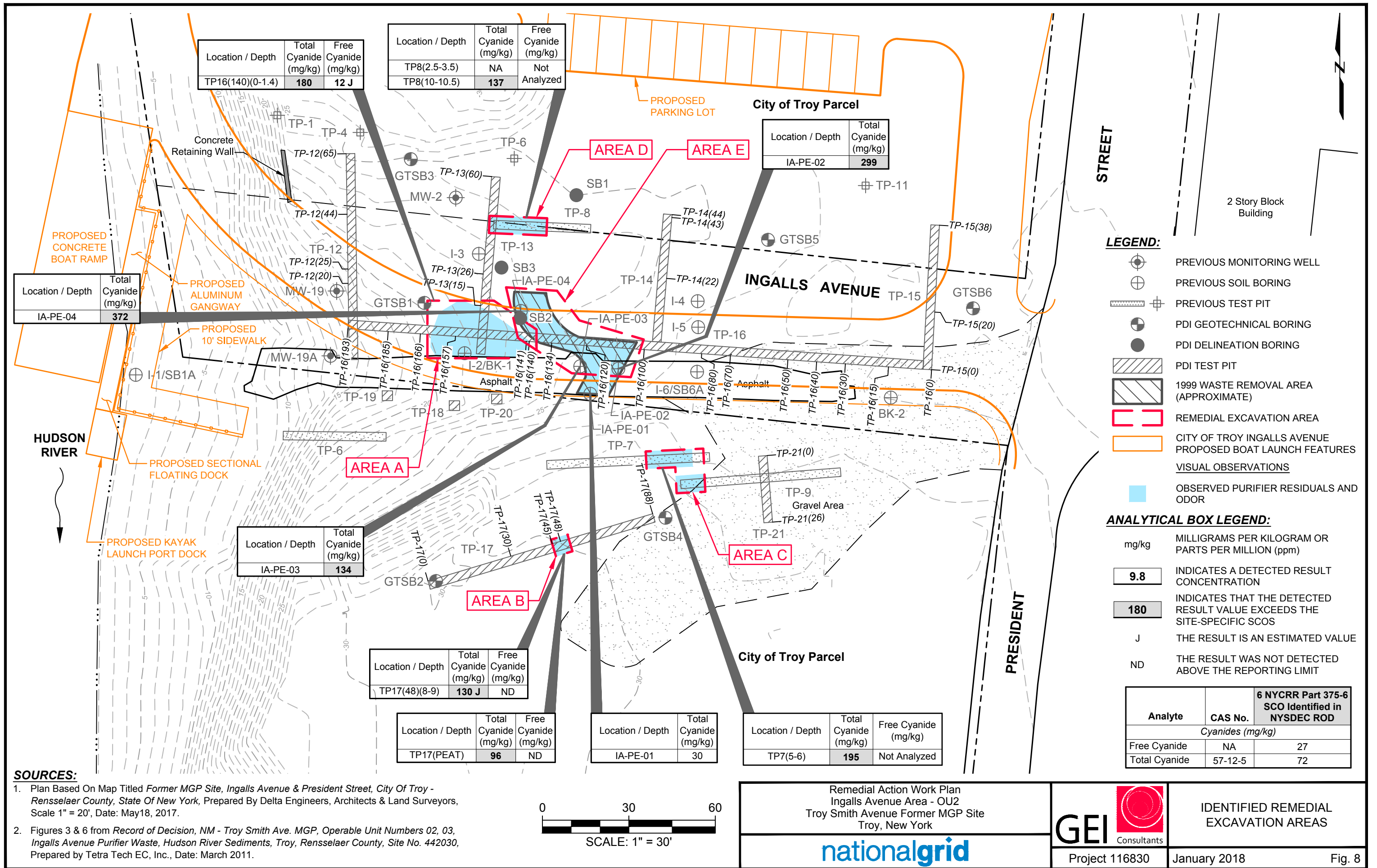
Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

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2017 EXPLORATION LOCATIONS AND CYANIDE RESULTS

Project 116830 January 2018 Fig. 7



Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP16(140)(0-1.4)	180	12 J

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP8(2.5-3.5)	NA	Not Analyzed
TP8(10-10.5)	137	Not Analyzed

Location / Depth	Total Cyanide (mg/kg)
IA-PE-02	299

Location / Depth	Total Cyanide (mg/kg)
IA-PE-04	372

Location / Depth	Total Cyanide (mg/kg)
IA-PE-03	134

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(48)(8-9)	130 J	ND

Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP17(PEAT)	96	ND

Location / Depth	Total Cyanide (mg/kg)
IA-PE-01	30

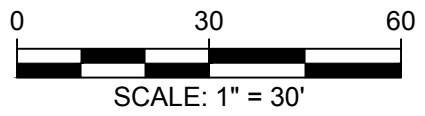
Location / Depth	Total Cyanide (mg/kg)	Free Cyanide (mg/kg)
TP7(5-6)	195	Not Analyzed

- LEGEND:**
- PREVIOUS MONITORING WELL
 - PREVIOUS SOIL BORING
 - PREVIOUS TEST PIT
 - PDI GEOTECHNICAL BORING
 - PDI DELINEATION BORING
 - PDI TEST PIT
 - 1999 WASTE REMOVAL AREA (APPROXIMATE)
 - REMEDIAL EXCAVATION AREA
 - CITY OF TROY INGALLS AVENUE PROPOSED BOAT LAUNCH FEATURES
 - VISUAL OBSERVATIONS
 - OBSERVED PURIFIER RESIDUALS AND ODOR

- ANALYTICAL BOX LEGEND:**
- mg/kg MILLIGRAMS PER KILOGRAM OR PARTS PER MILLION (ppm)
 - 9.8** INDICATES A DETECTED RESULT CONCENTRATION
 - 180** INDICATES THAT THE DETECTED RESULT VALUE EXCEEDS THE SITE-SPECIFIC SCOS
 - J THE RESULT IS AN ESTIMATED VALUE
 - ND THE RESULT WAS NOT DETECTED ABOVE THE REPORTING LIMIT

Analyte	CAS No.	6 NYCRR Part 375-6 SCO Identified in NYSDEC ROD
Cyanides (mg/kg)		
Free Cyanide	NA	27
Total Cyanide	57-12-5	72

- SOURCES:**
- Plan Based On Map Titled Former MGP Site, Ingalls Avenue & President Street, City Of Troy - Rensselaer County, State Of New York, Prepared By Delta Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.
 - Figures 3 & 6 from Record of Decision, NM - Troy Smith Ave. MGP, Operable Unit Numbers 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030, Prepared by Tetra Tech EC, Inc., Date: March 2011.



Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

nationalgrid

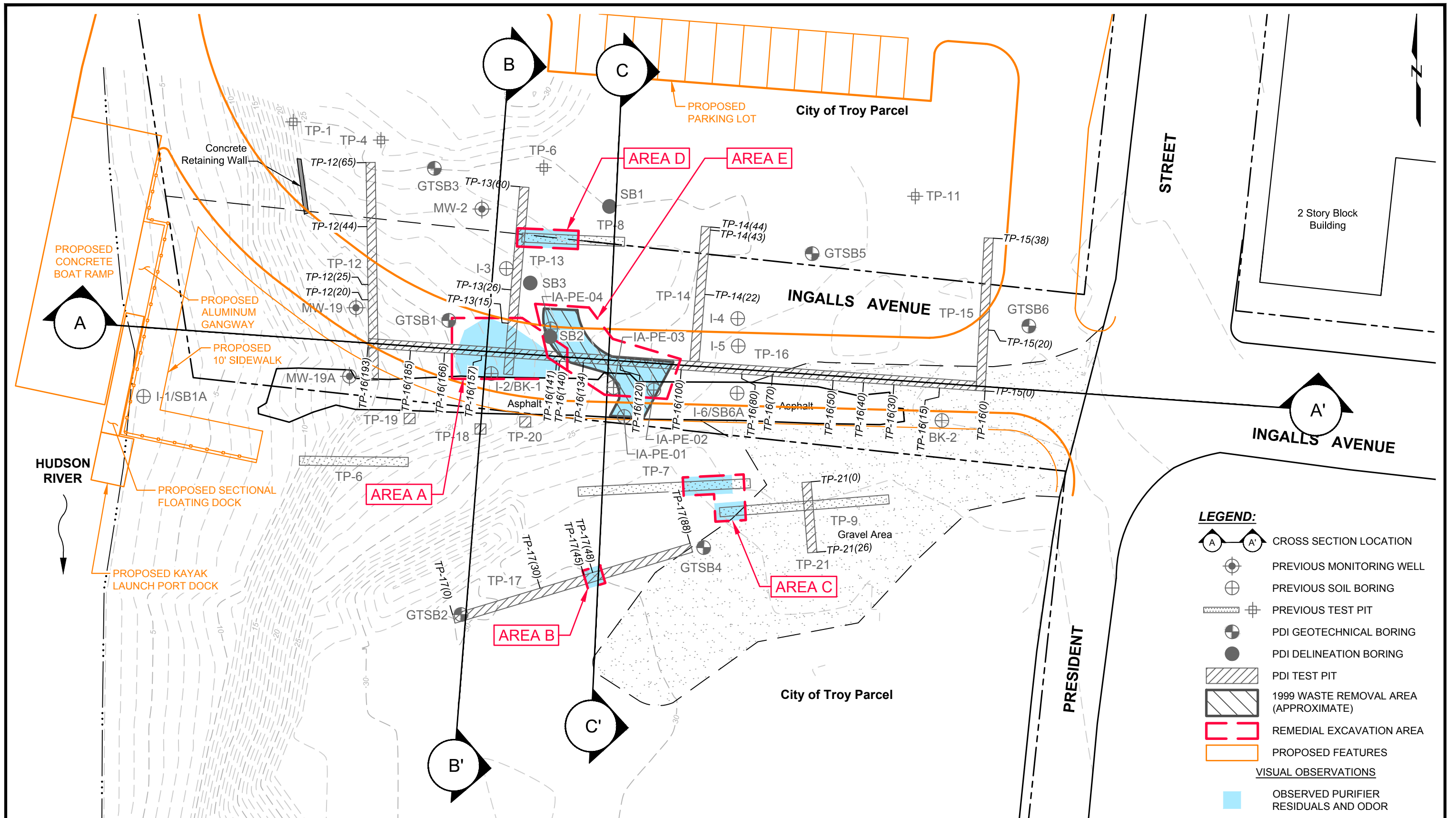
GEI Consultants

Project 116830

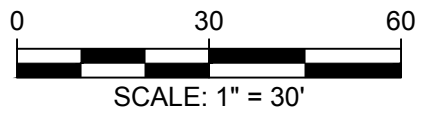
IDENTIFIED REMEDIAL EXCAVATION AREAS

January 2018

Fig. 8



SOURCE:
 Plan Based On Map Titled Former Mgp Site, Ingalls Avenue & President Street,
 City Of Troy - Rensselaer County, State Of New York, Prepared By Delta
 Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.



Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

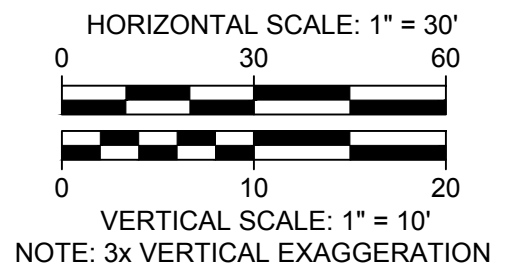
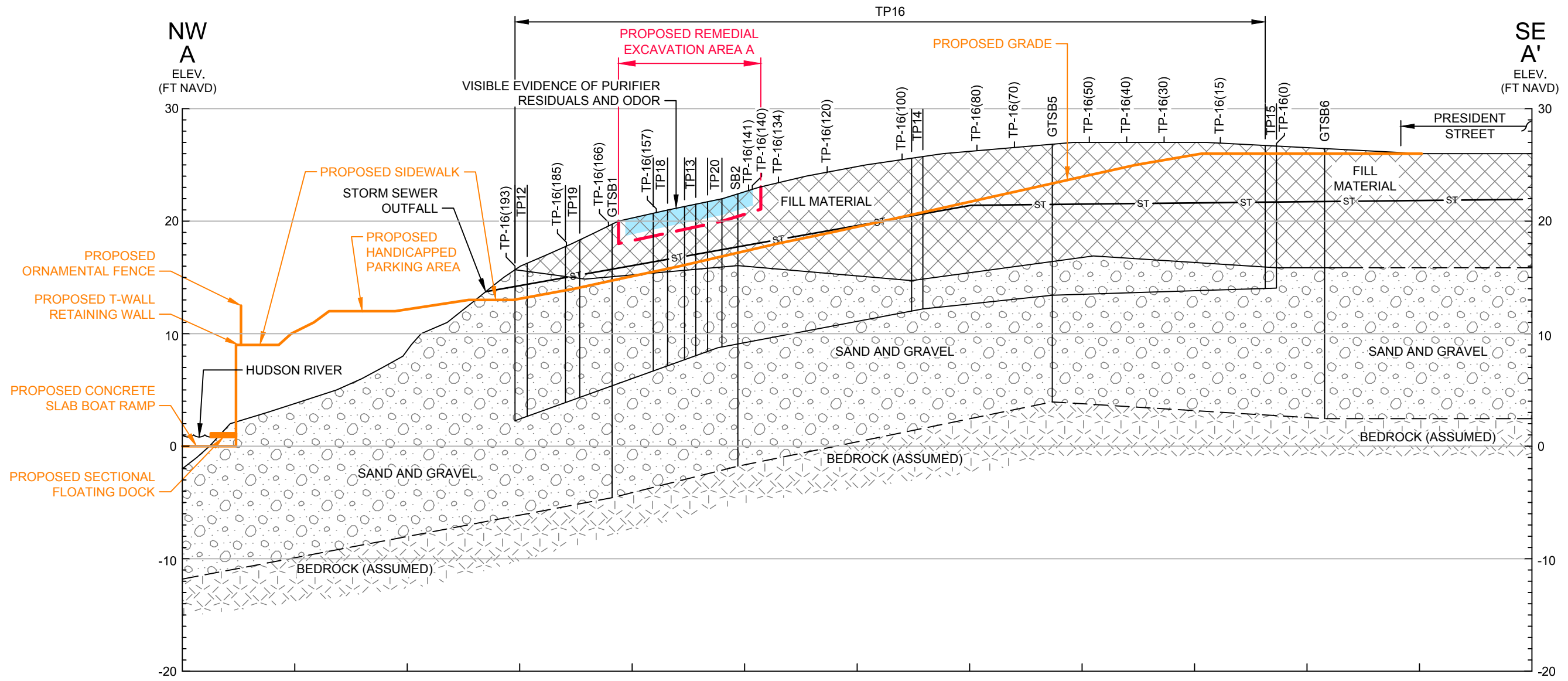


CROSS SECTION
 LOCATION MAP

Project 116830

January 2018

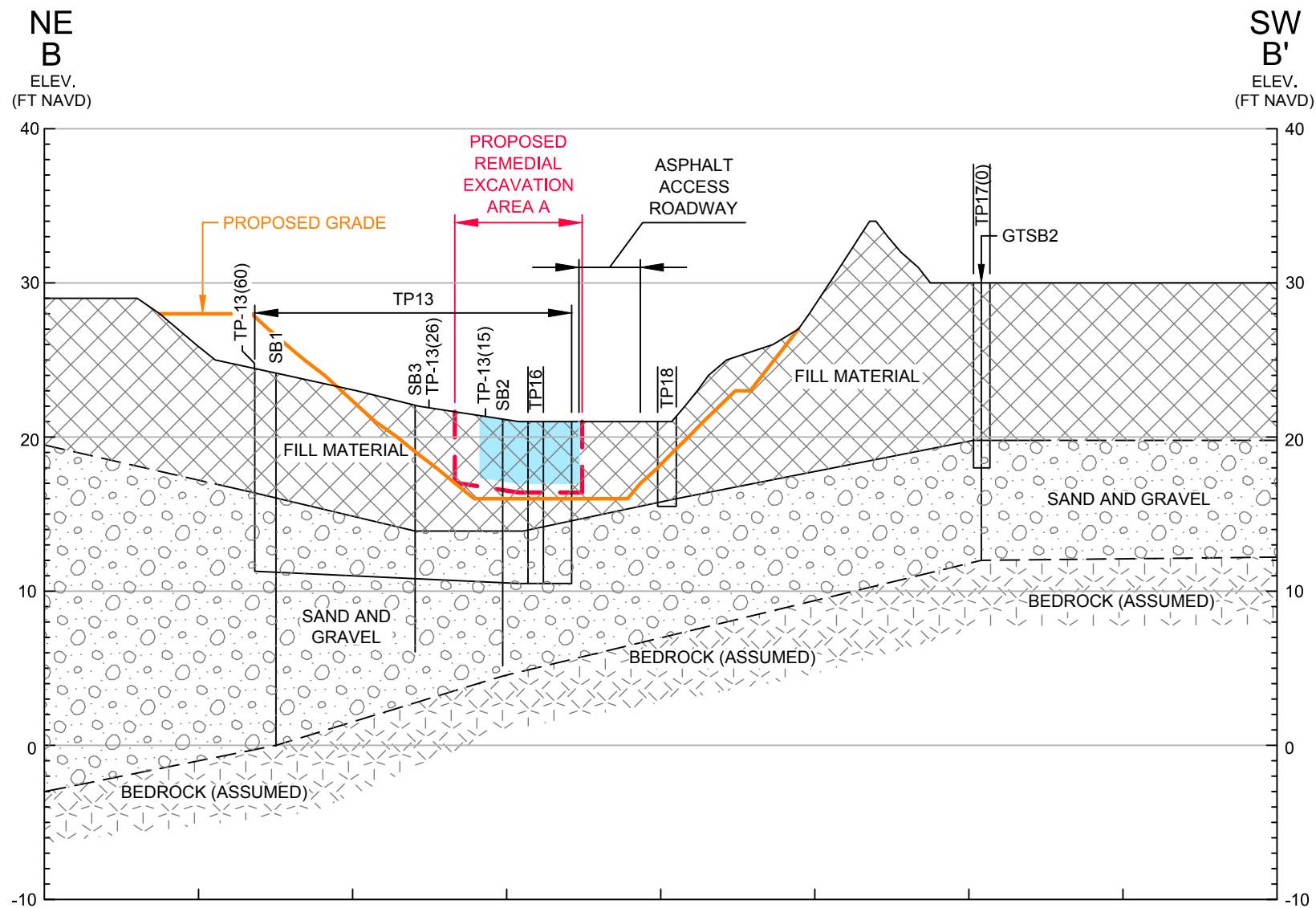
Fig. 9



- LEGEND:**
- CITY OF TROY PROPOSED EXCAVATION AREA
 - REMEDIAL EXCAVATION AREA
 - ST — STORM SEWER PIPE (APPROXIMATE)
 - OBSERVED PURIFIER RESIDUALS AND ODOR
- GEOLOGY**
- FILL MATERIAL
 - SAND AND GRAVEL
 - BEDROCK (ASSUMED)

Remedial Action Work Plan Ingalls Avenue Area - OU2 Troy Smith Avenue Former MGP Site Troy, New York		CROSS SECTION A-A'
	Project 116830	January 2018

Fig. 10



HORIZONTAL SCALE: 1" = 30'
 0 30 60
 0 10 20
 VERTICAL SCALE: 1" = 10'
 NOTE: 3x VERTICAL EXAGGERATION

LEGEND:

- CITY OF TROY PROPOSED EXCAVATION AREA
 - - - REMEDIAL EXCAVATION AREA
 - OBSERVED PURIFIER RESIDUALS AND ODOR
- GEOLOGY**
- FILL MATERIAL
 - SAND AND GRAVEL
 - BEDROCK (ASSUMED)

Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

nationalgrid

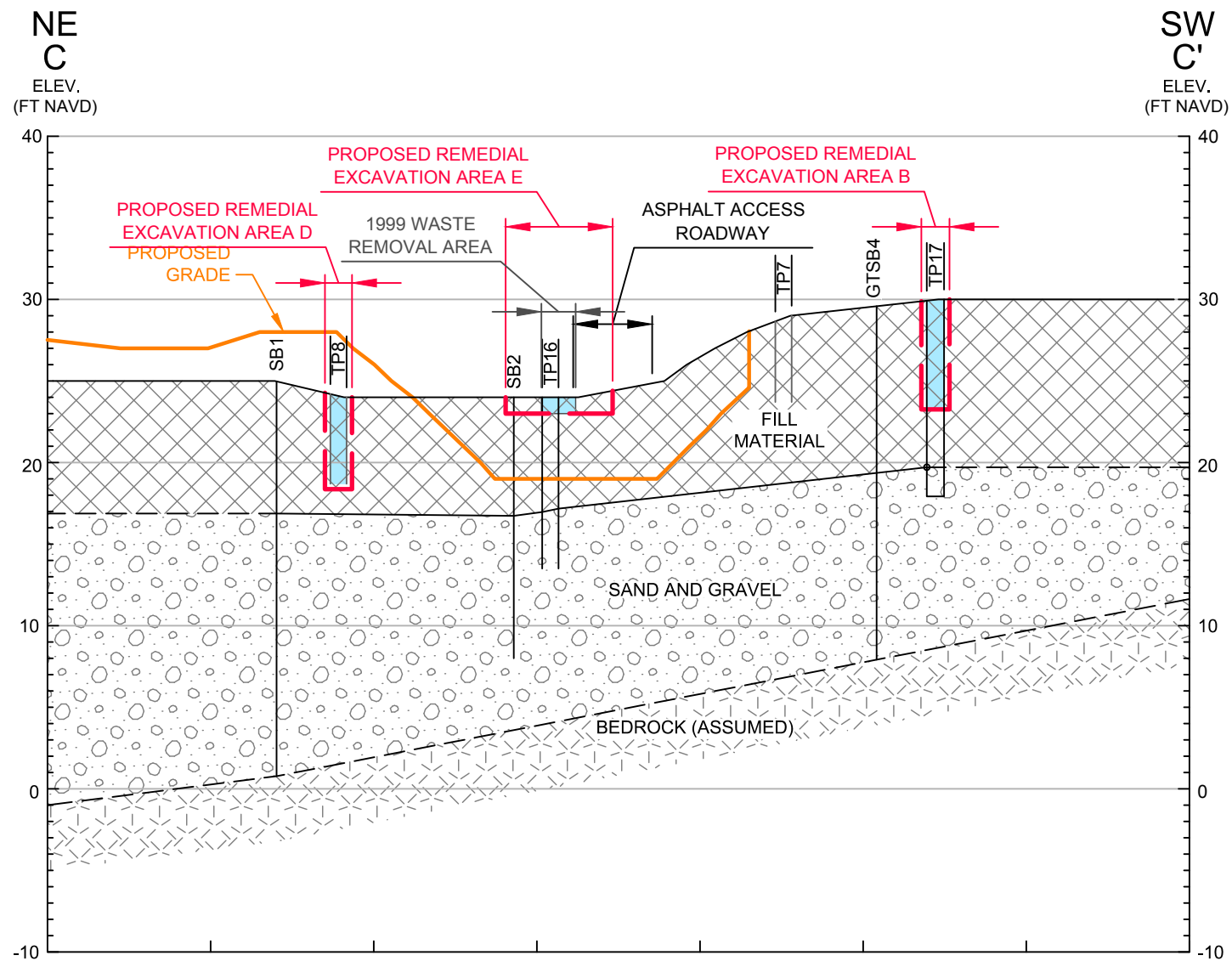


CROSS SECTION
 B-B'

Project 116830

January 2018

Fig. 11



HORIZONTAL SCALE: 1" = 30'
 0 30 60
 VERTICAL SCALE: 1" = 10'
 0 10 20
 NOTE: 3x VERTICAL EXAGGERATION

LEGEND:

- CITY OF TROY PROPOSED EXCAVATION AREA
 - - - REMEDIAL EXCAVATION AREA
 - OBSERVED PURIFIER RESIDUALS AND ODOR
- GEOLOGY**
- FILL MATERIAL
 - SAND AND GRAVEL
 - BEDROCK (ASSUMED)

Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

nationalgrid

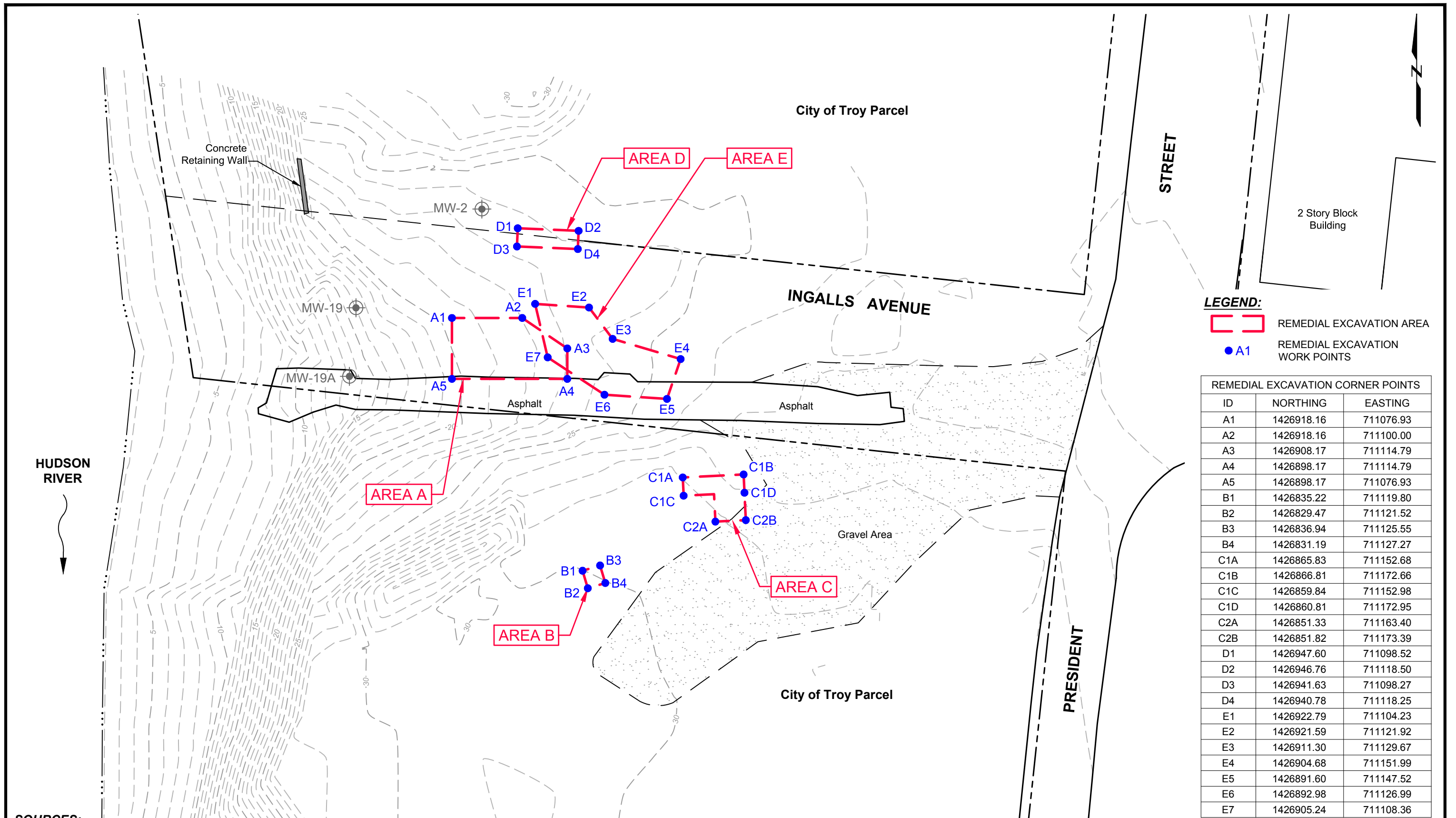


CROSS SECTION
 C-C'

Project 116830

January 2018

Fig. 12

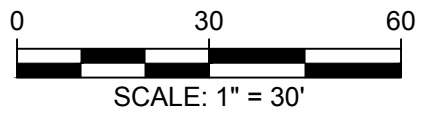


LEGEND:
 REMEDIAL EXCAVATION AREA
 A1 REMEDIAL EXCAVATION WORK POINTS

REMEDIAL EXCAVATION CORNER POINTS		
ID	NORTHING	EASTING
A1	1426918.16	711076.93
A2	1426918.16	711100.00
A3	1426908.17	711114.79
A4	1426898.17	711114.79
A5	1426898.17	711076.93
B1	1426835.22	711119.80
B2	1426829.47	711121.52
B3	1426836.94	711125.55
B4	1426831.19	711127.27
C1A	1426865.83	711152.68
C1B	1426866.81	711172.66
C1C	1426859.84	711152.98
C1D	1426860.81	711172.95
C2A	1426851.33	711163.40
C2B	1426851.82	711173.39
D1	1426947.60	711098.52
D2	1426946.76	711118.50
D3	1426941.63	711098.27
D4	1426940.78	711118.25
E1	1426922.79	711104.23
E2	1426921.59	711121.92
E3	1426911.30	711129.67
E4	1426904.68	711151.99
E5	1426891.60	711147.52
E6	1426892.98	711126.99
E7	1426905.24	711108.36

SOURCES:

1. Plan Based On Map Titled *Former MGP Site, Ingalls Avenue & President Street, City Of Troy - Rensselaer County, State Of New York*, Prepared By Delta Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.
2. Figures 3 & 6 from *Record of Decision, NM - Troy Smith Ave. MGP, Operable Unit Numbers 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030*, Prepared by Tetra Tech EC, Inc., Date: March 2011.



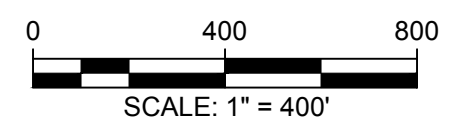
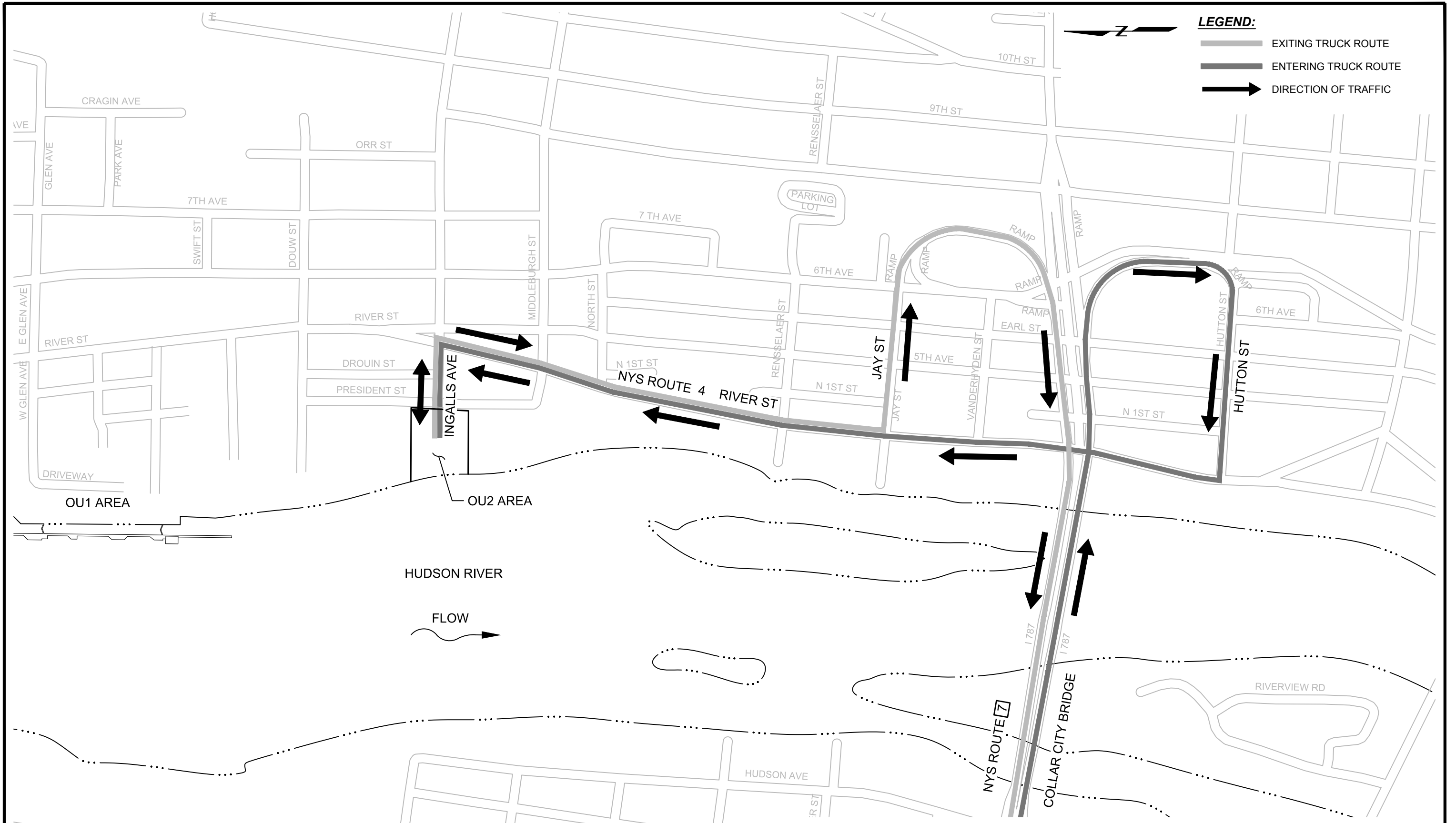
Remedial Action Work Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

Project 116830

REMEDIAL EXCAVATION
 CORNER POINTS

January 2018

Fig. 13



Remedial Action Work Plan Ingalls Avenue Area - OU2 Troy Smith Avenue Former MGP Site Troy, New York		TRUCK ROUTE
	Project 116830	January 2018 Fig. 14

Appendix A

Soil Boring Logs and Test Pit Logs

2017 PDI Test Pit Logs and Soil Boring Logs

**Soil Boring, Test Pit, and Sediment Core Key
Color Code for the Description of MGP-Related and Petroleum-Related
Residuals at MGP Sites**

COLOR CODE		DESCRIPTION
		TAR SATURATED FILL OR SOIL
		COATED MATERIAL OR LENSES
		HARDENED TAR
		NAPL BLEBS, GLOBS, OR SHEEN
		STAINING, ODOR
		PETROLEUM IMPACTS - SATURATION AND SHEEN
		PETROLEUM IMPACTS - STAINING AND ODORS
		PURIFIER RESIDUALS AND ODOR
		NO OBSERVED IMPACTS

Test Pit Logs



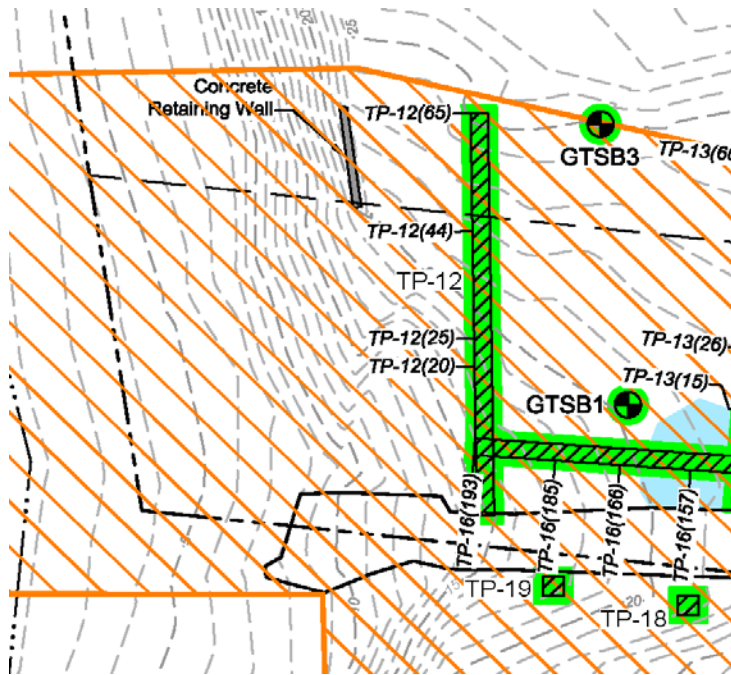
Test Pit Log

TP12(20)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP12(20)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 19'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426909.507
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711054.159
START DATE: 5.3.2017	START TIME:	LATITUDE: 42° 44' 50.23
FINISH DATE: 5.3.2017	FINISH TIME:	LONGITUDE: 73° 41' 05.62

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Red bricks mixed in brown sand matrix. White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.</p>	
2				FILL		
3	0.0			FILL	<p>Fill Material: White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.</p>	
4				FILL	<p>Fill Material: White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.</p>	
5	0.0	TP12(20) (4-5)				
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0					
8				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0					
10						
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



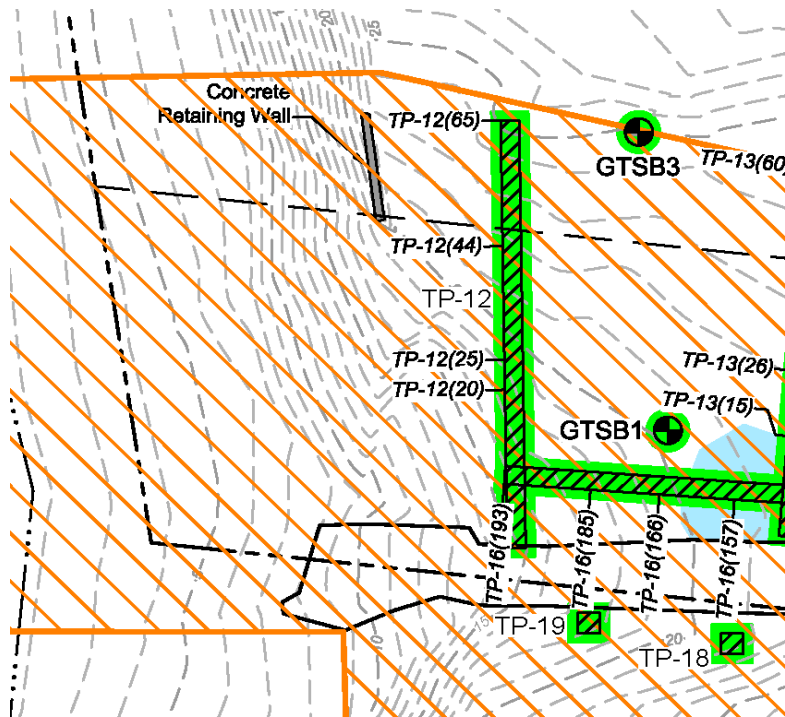
Test Pit Log

TP12(25)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP12(25)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 25'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426914.562
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711053.364
START DATE: 5.3.2017	START TIME: 1430	LATITUDE: 42° 44' 50.28
FINISH DATE: 5.3.2017	FINISH TIME: 1445	LONGITUDE: 73° 41' 05.63

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Red bricks mixed in brown sand matrix. White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.	
3	0.0			FILL	Fill Material: White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.	
4				FILL	Fill Material: White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.	
5	0.0					
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8						
9	0.0					
10						
11	0.0	TP12(25) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



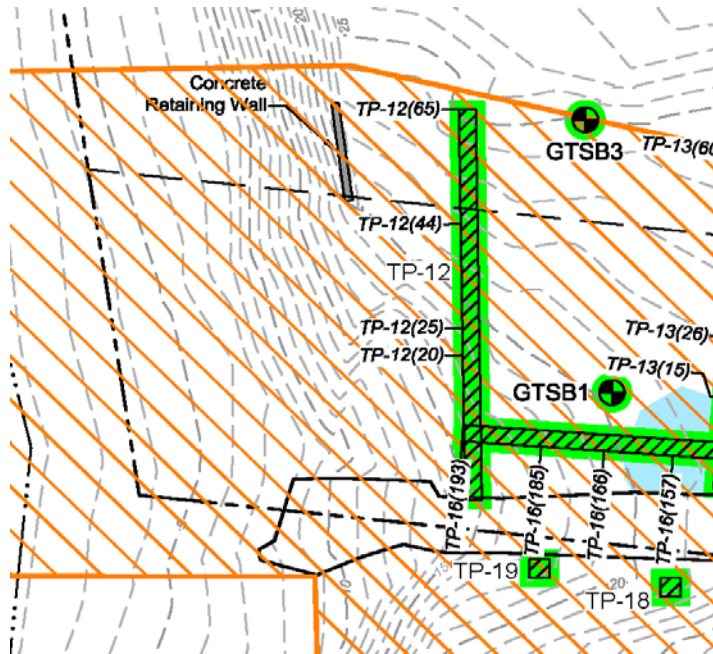
Test Pit Log

TP12(44)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP12(44)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 23'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426941.887
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711052.354
START DATE: 5.3.2017	START TIME: 1455	LATITUDE: 42° 44' 50.55
FINISH DATE: 5.3.2017	FINISH TIME: 1458	LONGITUDE: 73° 41' 05.64

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Red bricks mixed in brown sand matrix. White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.	
3	0.0			FILL	Fill Material: White and gray ashes in horizontal layers. Glass, metal, cinders, slag mixed in brown sand matrix. Loose, moist.	
4				FILL	Fill Material: Brick fragments and gray ash mixed in brown sand matrix.	
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6						
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8						
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10						
11	0.0	TP12(44) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



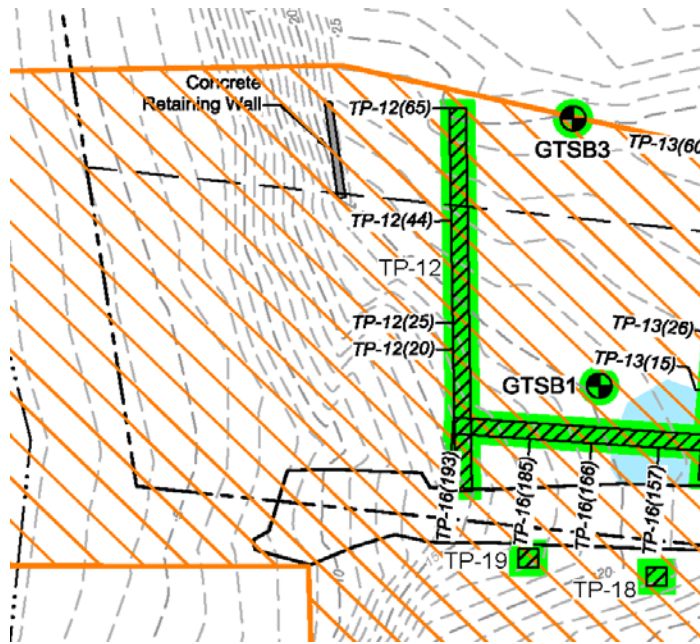
Test Pit Log

TP12(65)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP12(65)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 25.5'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426969.179
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711050.222
START DATE: 5.3.2017	START TIME: 1455	LATITUDE: 42° 44' 50.82
FINISH DATE: 5.3.2017	FINISH TIME: 1459	LONGITUDE: 73° 41' 05.67

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Red bricks mixed in brown silt matrix. Glass, rags, metal, cinders, slag mixed in gray silt matrix. Loose, moist.	
3	0.0			FILL	Fill Material: Red bricks mixed in brown and gray silt matrix.	
4				FILL	Fill Material: Red bricks mixed in brown and gray silt matrix.	
5	0.0	TP12(65) (4-5)				
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0					
8				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0					
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0					
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Suite N
Ithaca New York 14850



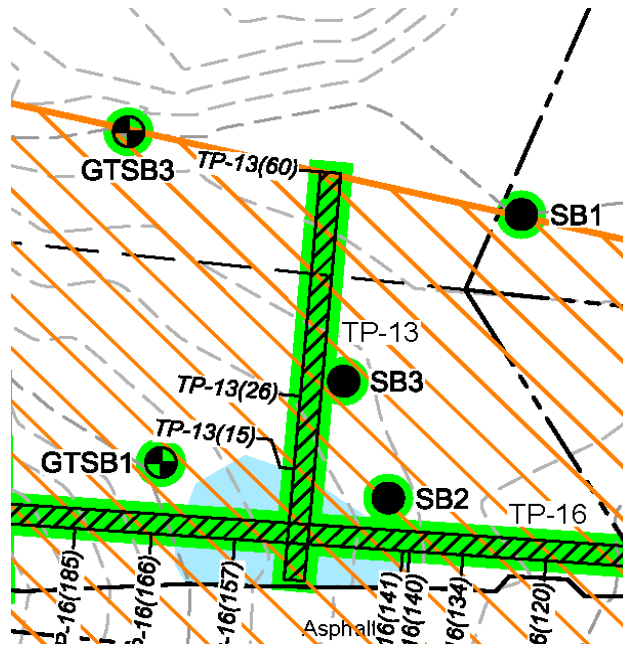
Test Pit Log

TP13(15)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP13(15)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 22'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426919.036
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711097.344
START DATE: 5.3.2017	START TIME: 125	LATITUDE: 42° 44' 50.32
FINISH DATE: 5.3.2017	FINISH TIME: 130	LONGITUDE: 73° 41' 05.04

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Red brick fragments mixed in gray silt matrix.	
3	0.0			FILL	Fill Material: Red brick fragments mixed in gray silt matrix.	
4				FILL	Fill Material: Red brick fragments mixed in gray silt matrix.	
5	0.0					
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0					
8				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0					
10						
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals



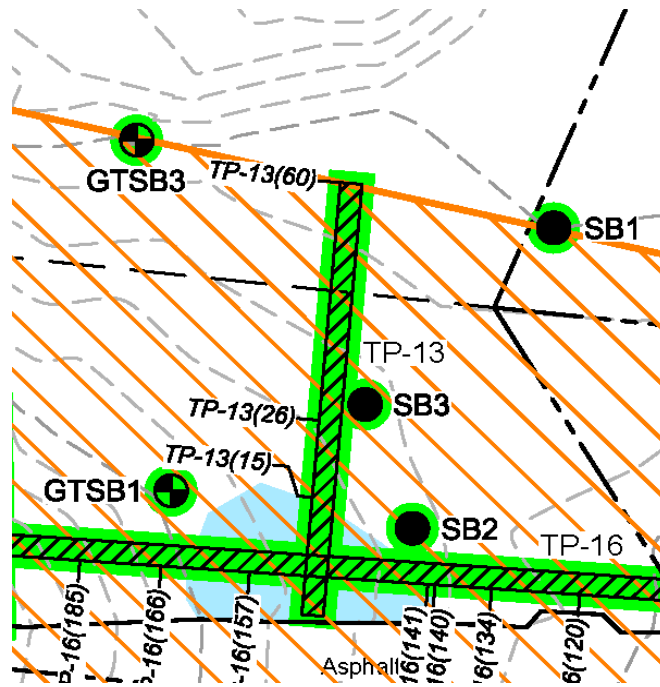
Test Pit Log

TP13(26)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP13(26)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 23'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426924.105
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711098.041
START DATE: 5.3.2017	START TIME: 145	LATITUDE: 42° 44' 50.37
FINISH DATE: 5.3.2017	FINISH TIME: 150	LONGITUDE: 73° 41' 05.03

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Red brick fragments mixed in gray and brown silt matrix. Fill in horizontal layers. Moist, loose.</p>	
2				FILL	<p>Fill Material: Red brick fragments mixed in gray and brown silt matrix. Fill in horizontal layers. Moist, loose.</p>	
3	0.0			FILL	<p>Fill Material: Red brick fragments mixed in gray and brown silt matrix. Fill in horizontal layers. Moist, loose.</p>	
4				FILL	<p>Fill Material: Red brick fragments mixed in gray and brown silt matrix. Fill in horizontal layers. Moist, loose.</p>	
5	0.0					
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0					
8				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0					
10						
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



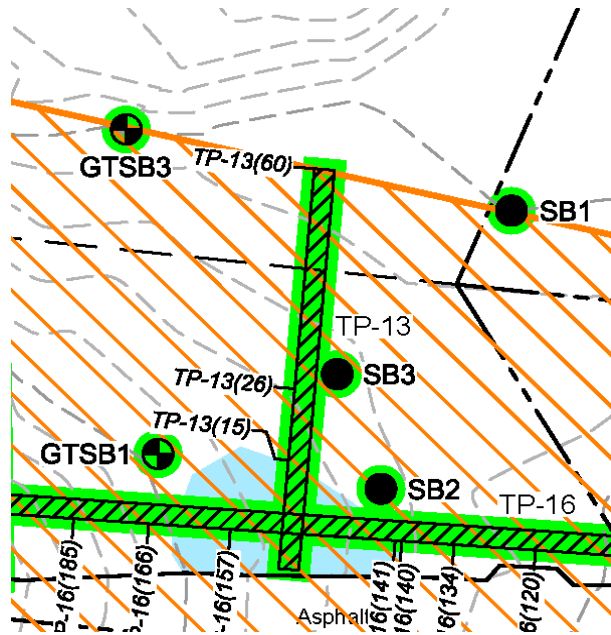
Test Pit Log

TP13(60)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP13(60)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 24.58'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426969.1785
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711128.619
START DATE: 5.3.2017	START TIME: 155	LATITUDE: 42° 44' 50.74
FINISH DATE: 5.3.2017	FINISH TIME: 200	LONGITUDE: 73° 41' 04.99

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Red bricks mixed in brown silt matrix. Glass, rags, metal, cinders, mixed in gray silt matrix. Loose, moist.</p>	
2				FILL	<p>Fill Material: Red bricks mixed in brown and gray silt matrix.</p>	
3	0.0			FILL	<p>Fill Material: Red bricks mixed in brown and gray silt matrix.</p>	
4				FILL	<p>Fill Material: Red bricks mixed in brown and gray silt matrix.</p>	
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6						
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8						
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10						
11	0.0	TP13(60) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



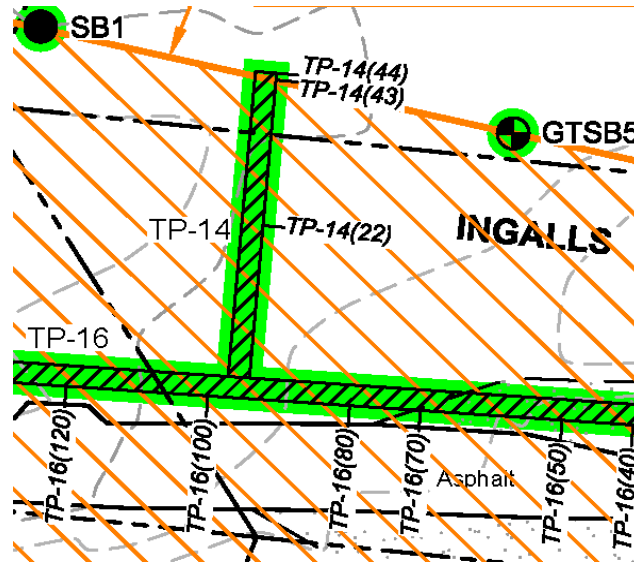
Test Pit Log

TP14(22)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP14(22)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 24'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426937.827
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711156.109
START DATE: 5.3.2017	START TIME: 755	LATITUDE: 42° 44' 50.50
FINISH DATE: 5.3.2017	FINISH TIME: 800	LONGITUDE: 73° 41' 04.25

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Red bricks mixed in brown sand matrix.</p>	
2				FILL	<p>Fill Material: White ash and clinkers in horizontal layer.</p>	
3	0.0			FILL	<p>Fill Material: Black ash and clinkers in horizontal layer.</p>	
4				FILL	Vertical metal angle iron.	
5	0.0			FILL	<p>Fill Material: Slag fragments, silt, sand, clinkers, in orange and brown layers.</p>	
6				FILL	<p>Fill Material: Brown silt and sand with bricks mixed in the soil matrix.</p>	
7	0.0			FILL		
8				FILL		
9	0.0			FILL		
10				FILL		
11	0.0			FILL		
12		TP14(22) (11-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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Ithaca New York 14850



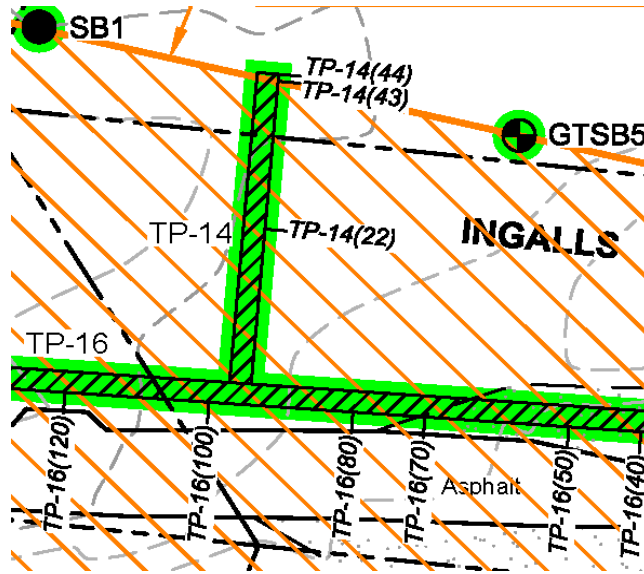
Test Pit Log

TP14(44)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP14(44)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 24.74'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426948.1231
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711160.3528
START DATE: 5.3.2017	START TIME: 810	LATITUDE: 42° 44' 50.60
FINISH DATE: 5.3.2017	FINISH TIME: 830	LONGITUDE: 73° 41' 04.19

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Red bricks mixed in brown sand matrix.	
3	0.0			FILL	Fill Material: Gray silt mixed with ashes and clinkers.	
4				FILL		
5	0.0	TP14(43) (4-6)		FILL	Fill Material: Gray silt mixed with ashes and clinkers. Trace brick fragments.	
6						
7	0.0			FILL	Fill Material: Gray silt mixed with clinkers, ashes, and metal debris.	
8				FILL	Vertical metal angle iron.	
9	0.0					
10				FILL	Fill Material: Gray silt mixed with clinkers, ashes, and metal debris.	
11	0.0					
12		TP14(44) (11-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals



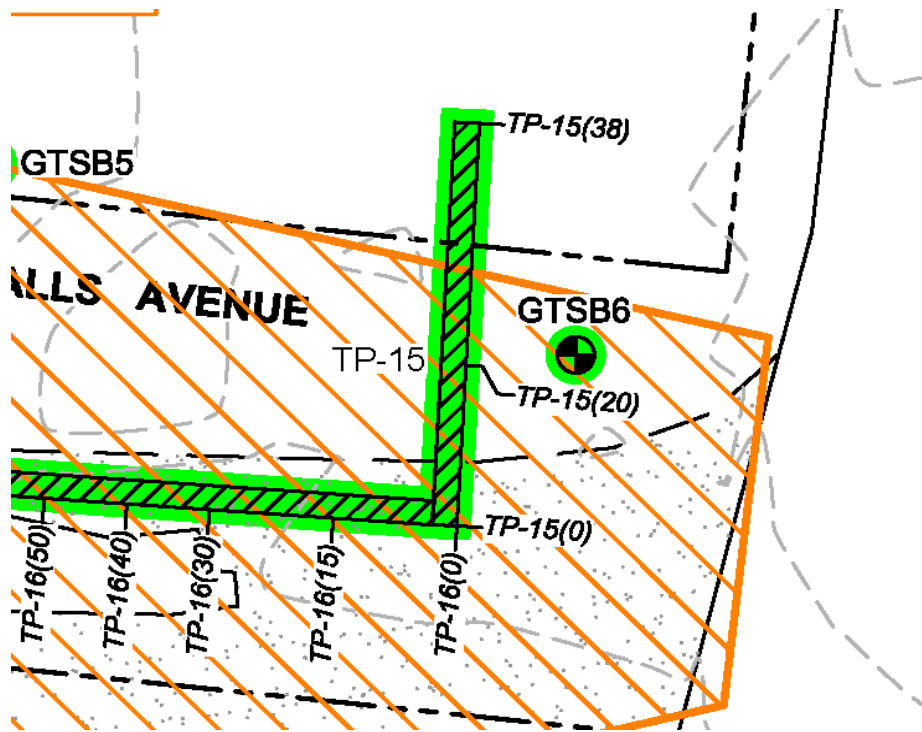
Test Pit Log

TP15(0)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP15(0)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426916.458
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711249.585
START DATE: 5.2.2017	START TIME: 825	LATITUDE: 42° 44' 50.28
FINISH DATE: 5.2.2017	FINISH TIME: 900	LONGITUDE: 73° 41' 03.00

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Dense layer of white ash in horizontal layer.</p> <p>Dense layer of black ash in horizontal layer.</p>	
2				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
3	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
4				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
5	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
6				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
7	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
8				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
9	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
10				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
11	0.0	TP15(0) (10.5-11.0)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12					BOTTOM OF TEST PIT EXCAVATION	
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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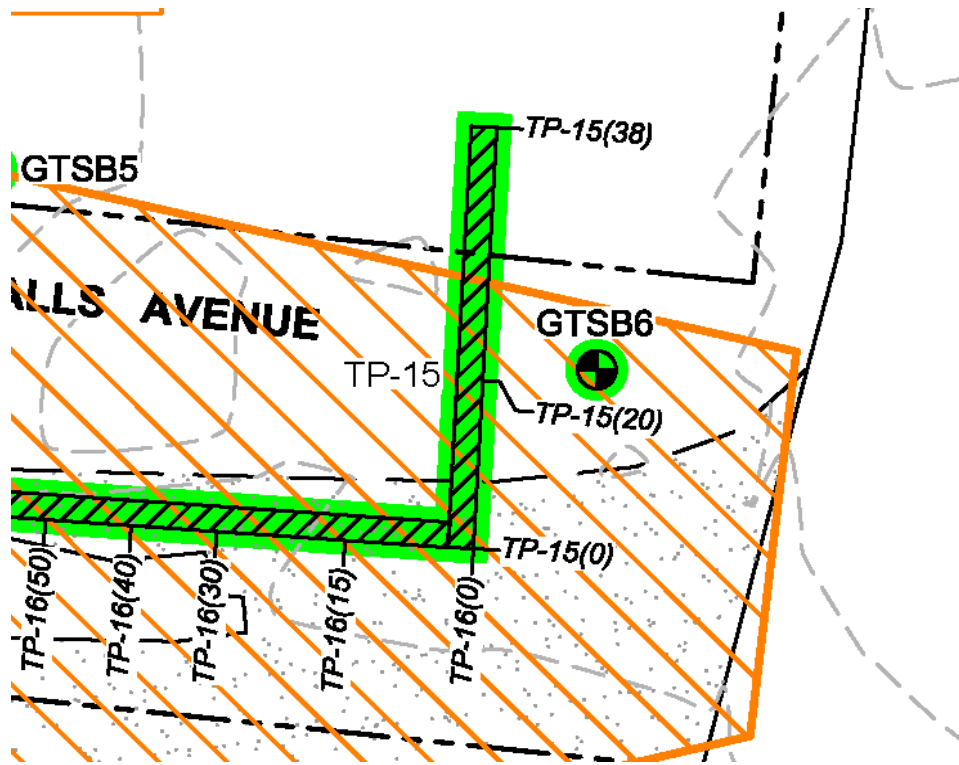
Test Pit Log

TP15(20)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP15(20)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88:
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88: 26'
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426935.713
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711251.637
START DATE: 5.2.2017	START TIME: 850	LATITUDE: 42° 44' 50.47
FINISH DATE: 5.2.2017	FINISH TIME: 920	LONGITUDE: 73° 41' 02.97

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Dense layer of white ash in horizontal layer.</p>	
2				FILL	<p>Dense layer of black ash in horizontal layer. Cut foundation stone mixed with silt and ash. Trace bottles.</p> <p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers. Trace metal fragments.</p>	
3	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
4				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
5	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers. Orange to red silt layer.</p>	
6				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
7	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
8				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers - with gray silt between.</p>	
9	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks</p>	
10						
11	0.0	TP15(20) (10.5-11.0)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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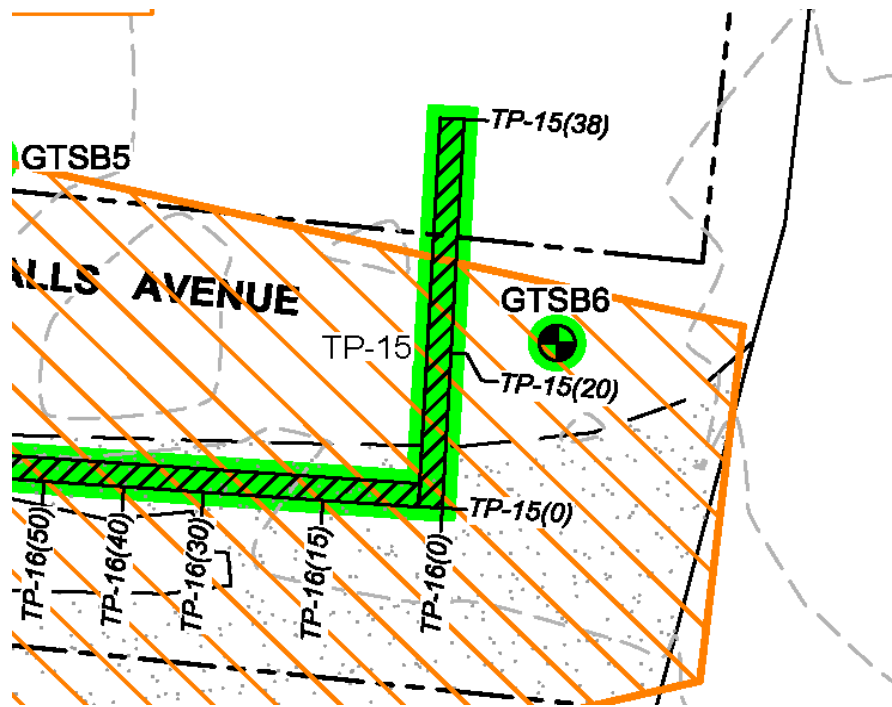
Test Pit Log

TP15(38)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP15(38)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26.44'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426944.4132
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711253.1456
START DATE: 5.2.2017	START TIME: 920	LATITUDE: 42° 44' 50.56
FINISH DATE: 5.2.2017	FINISH TIME: 940	LONGITUDE: 73° 41' 02.95

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.</p> <p>Fill Material: Dense layer of white ash and clinkers in horizontal layer.</p> <p>Dense layer of black ash in horizontal layer. Cut foundation stone mixed with silt and ash. Trace bottles and bricks.</p>	
2				FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers. Trace metal fragments.</p>	
3	0.0			FILL	<p>Fill Material: Layers of ash, clinkers, slag, glass, foundation stone, coal fragments, bricks in horizontal layers.</p>	
4						
5	0.0					
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8						
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10						
11	0.0	TP15(38) (10.5-11.0)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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Ithaca New York 14850



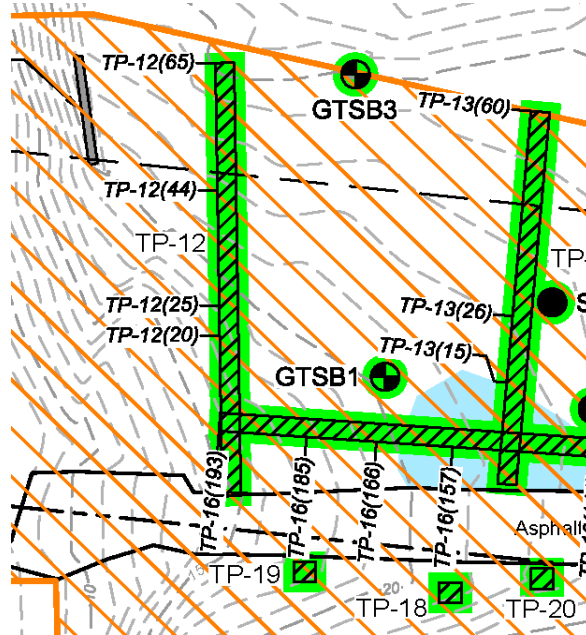
Test Pit Log

TP16(193)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(193)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 15.8'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426909.9372
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711049.3943
START DATE: 5.3.2017	START TIME: 1040	LATITUDE: 42° 44' 50.23
FINISH DATE: 5.3.2017	FINISH TIME: 1045	LONGITUDE: 73° 41' 05.68

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
2						
3	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
4						
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6						
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8						
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10						
11	0.0	TP16(193) (10-12)				
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



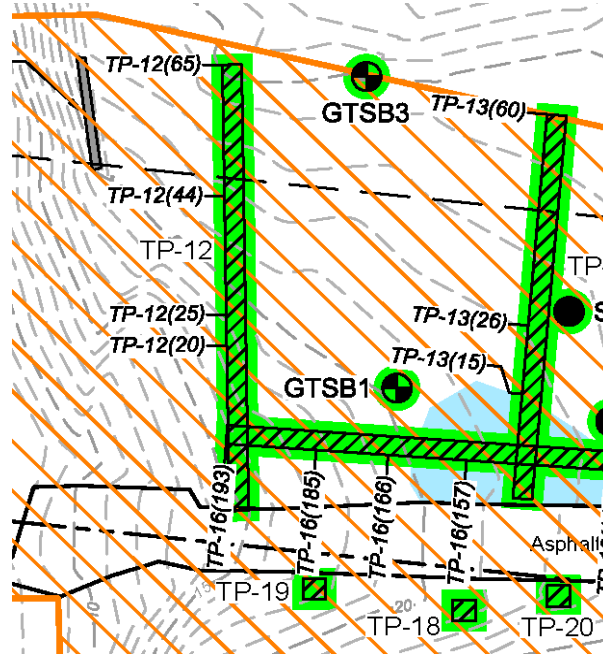
Test Pit Log

TP16(185)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(185)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 17'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426908.596
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711064.614
START DATE: 5.3.2017	START TIME: 1040	LATITUDE: 42° 44' 50.22
FINISH DATE: 5.3.2017	FINISH TIME: 1045	LONGITUDE: 73° 41' 05.48

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			Fill	Fill Material: Fill Material: Sand with Silt and Gravel; moist; loose; dark brown. Trace brick fragments.	
2	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
3	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
4	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12					BOTTOM OF TEST PIT EXCAVATION	
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals



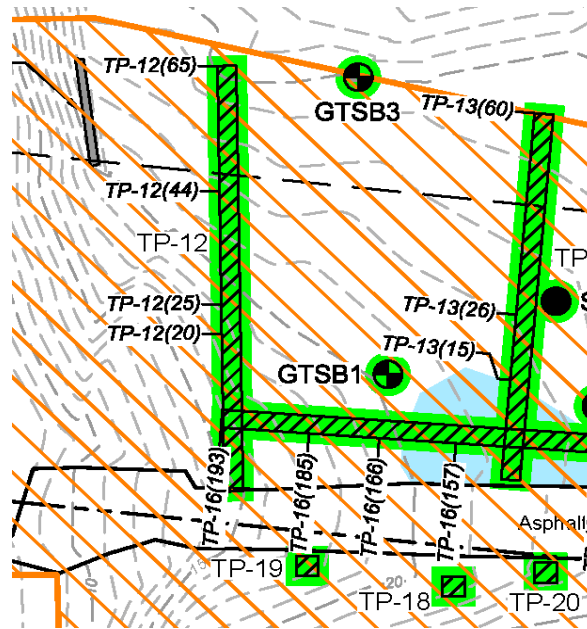
Test Pit Log

TP16(166)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(166)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 18'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426906.751
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711083.286
START DATE: 5.3.2017	START TIME: 1145	LATITUDE: 42° 44' 50.20
FINISH DATE: 5.3.2017	FINISH TIME: 1150	LONGITUDE: 73° 41' 05.23

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	38.2			Fill	Fill Material: From 0-0.5 feet - Brown wood fibers in a dense, compressed layer. Strong naphthalene-like odor. Trace white crystalline material mixed in the wood fiber matrix. Some gray ash.	Based on the physical characteristics (brown compressed dense wood fibers), and on the naphthalene-like odor, this material is assumed to be a MGP-related residual.
2				Fill	Fill Material: Red and yellow bricks mixed with brown sand.	
3	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
4				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Suite N
Ithaca New York 14850



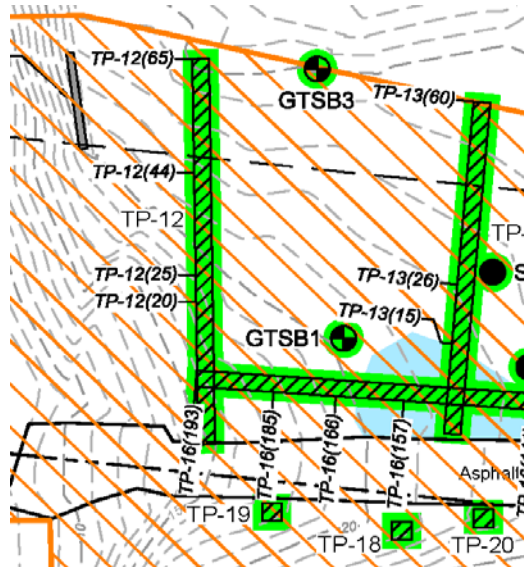
Test Pit Log

TP16(157)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(157)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 19'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426905.826
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711092.248
START DATE: 5.3.2017	START TIME: 1135	LATITUDE: 42° 44' 50.19
FINISH DATE: 5.3.2017	FINISH TIME: 1140	LONGITUDE: 73° 41' 05.11

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	49.6			Fill	<p>Fill Material:</p> <p>From 0-1.4 feet - Brown wood fibers in a dense, compressed layer.</p> <p>Strong naphthalene-like odor. Trace white crystalline material mixed in the wood fiber matrix. Some gray ash.</p>	Based on the physical characteristics (brown compressed dense wood fibers), and on the naphthalene-like odor, this material is assumed to be a MGP-related residual.
2	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
3	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
4	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



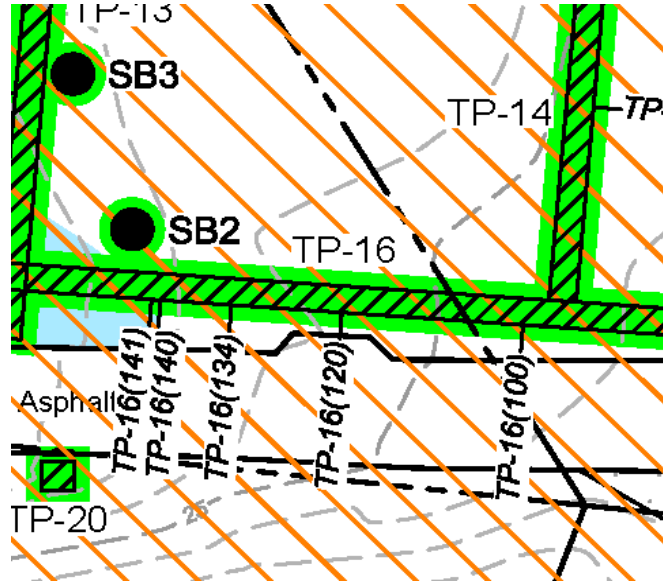
Test Pit Log

TP16(141)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(141)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 21'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426904.972
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711108.672
START DATE: 5.3.2017	START TIME: 1100	LATITUDE: 42° 44' 50.18
FINISH DATE: 5.3.2017	FINISH TIME: 1130	LONGITUDE: 73° 41' 04.89

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	59.2			Fill	<p>Fill Material:</p> <p>From 0-1.4 feet - Brown wood fibers in a dense, compressed layer.</p> <p>Strong naphthalene-like odor. Trace white crystalline material mixed in the wood fiber matrix. Some gray ash.</p>	Based on the physical characteristics (brown compressed dense wood fibers), and on the naphthalene-like odor, this material is assumed to be a MGP-related residual.
2						
3	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
4						
5	0.0	TP16(141) (5-6)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6						
7	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
8						
9	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
10						
11	0.0	TP16(141) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



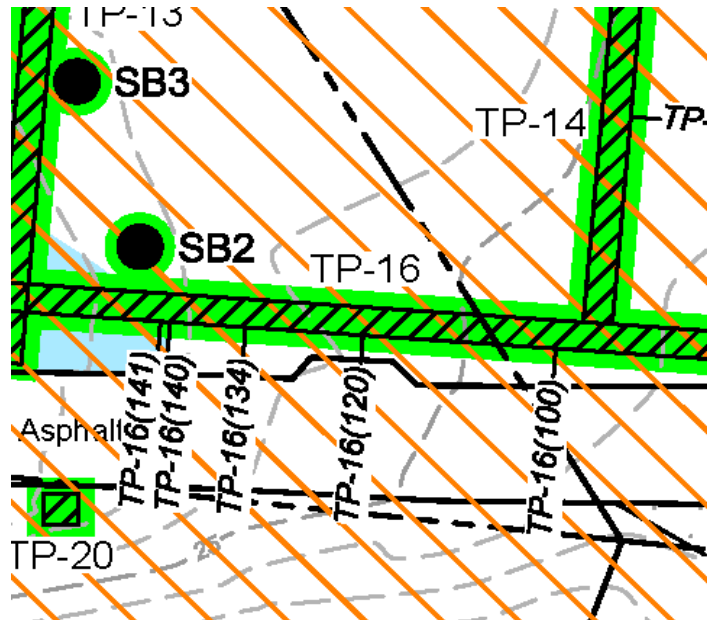
Test Pit Log

TP16(140)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(140)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 21'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426904.979
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711109.418
START DATE: 5.2.2017	START TIME: 1500	LATITUDE: 42° 44' 50.18
FINISH DATE: 5.2.2017	FINISH TIME: 1500	LONGITUDE: 73° 41' 04.88

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	50.8	TP16(140) (0-1.4)		Fill	<p>Fill Material: From 0-1.4 feet - Brown wood fibers in a dense, compressed layer. Strong naphthalene-like odor. Trace white crystalline material mixed in the wood fiber matrix.</p> <p>Fill Material: Brown coarse sand and gravel.</p>	Based on the physical characteristics (brown compressed dense wood fibers), and on the naphthalene-like odor, this material is assumed to be a MGP-related residual.
2					BOTTOM OF TEST PIT EXCAVATION	
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



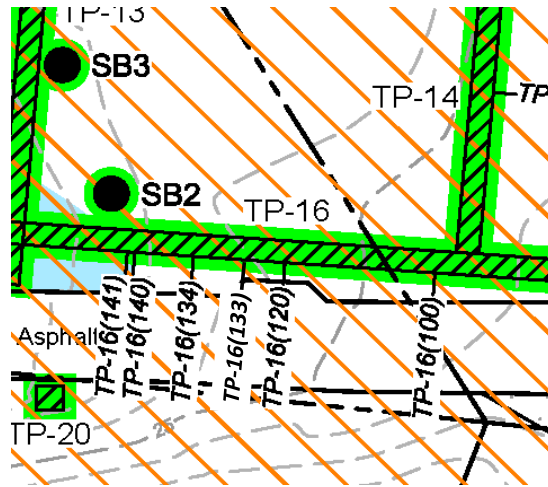
Test Pit Log

TP16(133)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(133)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 22'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426904.032
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711116.143
START DATE: 5.3.2017	START TIME: 745	LATITUDE: 42° 44' 50.17
FINISH DATE: 5.3.2017	FINISH TIME: 800	LONGITUDE: 73° 41' 04.79

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Red and yellow bricks in brown silt matrix. Some gray ash.	
3	0.0			FILL	Fill Material: Red and yellow bricks in brown silt matrix. Some gray ash.	
4				FILL	Fill Material: Layer of black coarse sand.	
5	0.0	TP16(134) (4.5)				
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7	0.0					
8				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
9	0.0					
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0					
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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Ithaca New York 14850



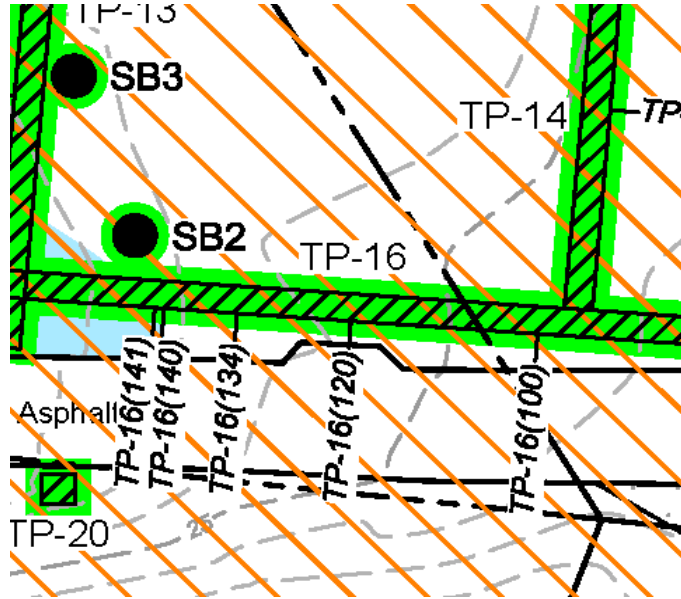
Test Pit Log

TP16(120)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(120)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 23'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426903.149
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711129.582
START DATE: 5.2.2017	START TIME: 1420	LATITUDE: 42° 44' 50.16
FINISH DATE: 5.2.2017	FINISH TIME: 1430	LONGITUDE: 73° 41' 04.61

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Coal fragments and brick fragments in black silt matrix.	
3	0.0			FILL	Fill Material: Horizontal wood fragments in brown silt and gravel.	
4				FILL	Fill Material: Brick fragments, white ashes, mixed in black silt matrix.	
5	0.0			FILL	Fill Material: Brick fragments, sheet metal, black silt and white ashes.	
6						
7	0.0					
8						
9	0.0			SP - SM		
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0	TP16(120) (11-12)		SP - SM		
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals



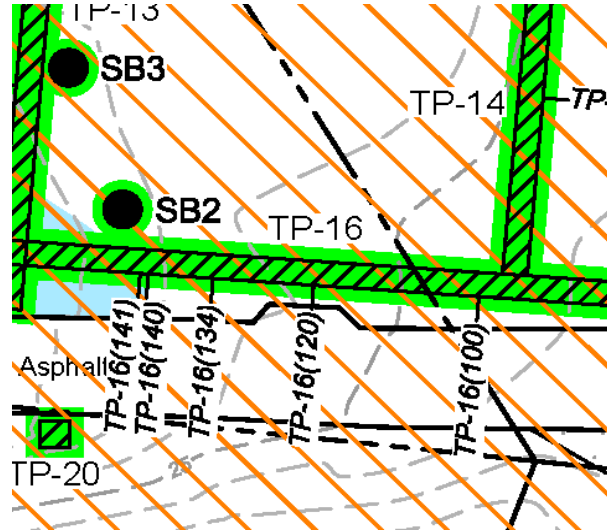
Test Pit Log

TP16(100)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(100)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 25'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426901.312
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711149.000
START DATE: 5.2.2017	START TIME: 1353	LATITUDE: 42° 44' 50.14
FINISH DATE: 5.2.2017	FINISH TIME: 1400	LONGITUDE: 73° 41' 04.35

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Trace cinders, ashes, brick fragments mixed in black silt matrix.	
3	0.0			FILL	Fill Material: Brick fragments mixed in black silt matrix.	
4				FILL		
5	0.0			FILL	Fill Material: Brick fragments, white ashes, mixed in black silt matrix. Bottles and glass fragments.	
6						
7	0.0			FILL	Fill Material: Brick fragments, sheet metal, black silt and white ashes.	
8						
9	0.0			FILL	Fill Material: Brick fragments, black silt and white ashes.	
10						
11	0.0			FILL	Fill Material: Brick fragments, black silt and white ashes.	
12		TP16(100) (11-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Suite N
Ithaca New York 14850



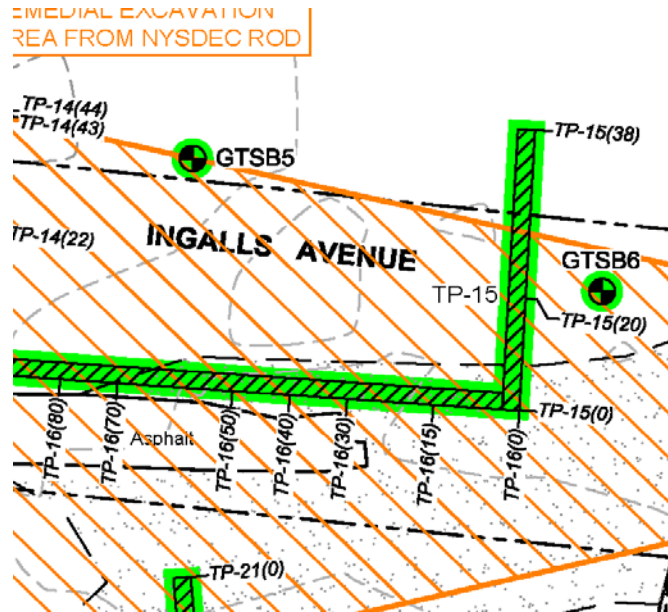
Test Pit Log

TP16(80)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(80)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426900.494
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711169.154
START DATE: 5.2.2017	START TIME: 130	LATITUDE: 42° 44' 50.13
FINISH DATE: 5.2.2017	FINISH TIME: 140	LONGITUDE: 73° 41' 04.08

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Brown sand mixed with cinders, rags and scrap metal.	
3	0.0			FILL	Fill Material: Brick fragments mixed in black silt matrix.	
4				FILL		
5	0.0			FILL	Fill Material: Brick fragments, sheet metal, black silt and white ashes.	
6				FILL	Fill Material: Brick fragments, sheet metal, black silt and white ashes.	
7	0.0			FILL		
8				FILL	Fill Material: Metal debris mixed in silt matrix.	
9	0.0			FILL	Fill Material: Brick fragments, black silt and white ashes.	
10				FILL	Fill Material: Brick fragments, black silt and white ashes.	
11	0.0					
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals



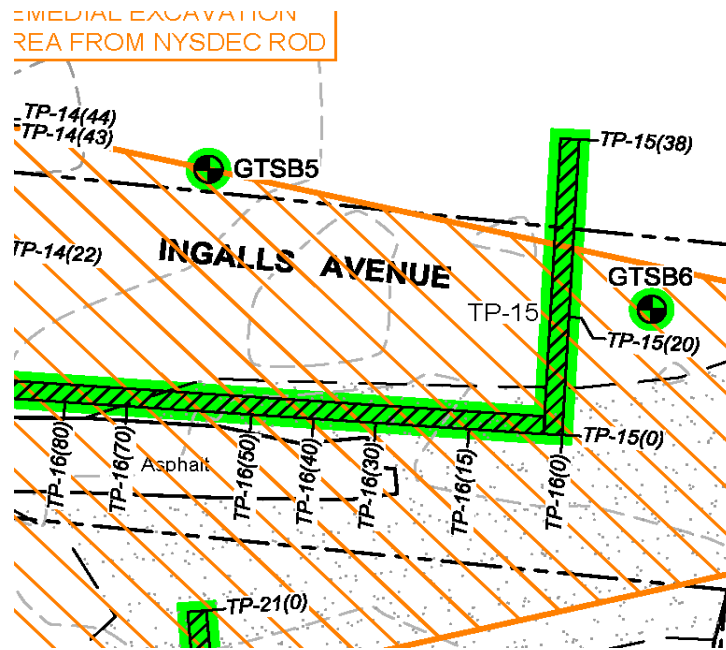
Test Pit Log

TP16(70)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(70)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426899.576
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711178.863
START DATE: 5.2.2017	START TIME: 1209	LATITUDE: 42° 44' 50.12
FINISH DATE: 5.2.2017	FINISH TIME: 125	LONGITUDE: 73° 41' 03.95

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Brown black silt mixed with cinders, rags and scrap metal. Trace PVC pipe.	
3	0.0			FILL	Fill Material: Broken concrete fragments	
4				FILL	Fill Material: Clinkers, ashes, and bricks mixed in silt matrix.	
5	0.0			FILL	Fill Material: Broken concrete fragments and bricks mixed in black silt matrix.	
6				FILL	Fill Material: Brick fragments, sheet metal, black silt and white ashes.	
7	0.0			FILL	Fill Material: Metal debris mixed in silt matrix.	
8				FILL	Fill Material: Brick fragments, black silt and white ashes.	
9	0.0			FILL	Fill Material: Brick fragments, black silt and white ashes.	
10				FILL	Fill Material: Brick fragments, black silt and white ashes.	
11	0.0			FILL	Fill Material: Brick fragments, black silt and white ashes.	
12		TP16(70) (11-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



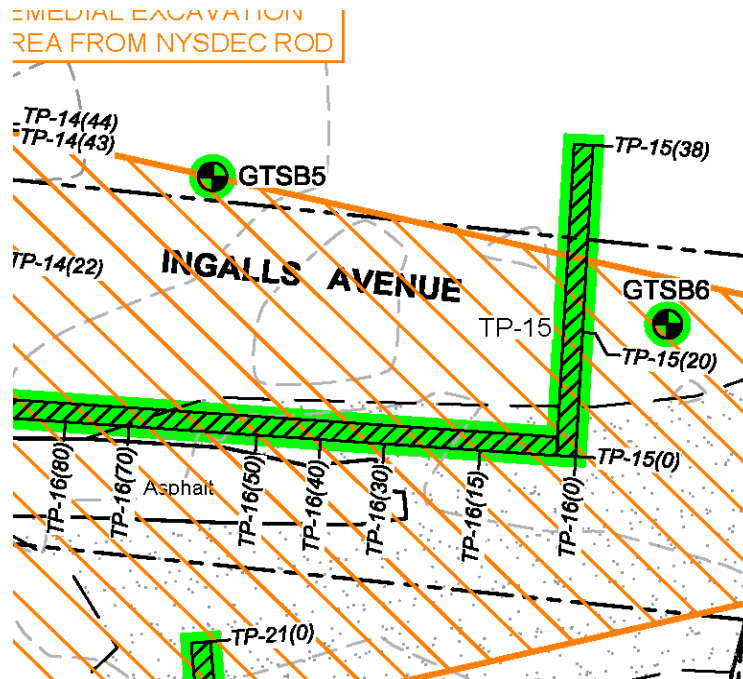
Test Pit Log

TP16(50)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(50)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	26'SURFACE ELEVATION CENTER NAVD88:
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426898.758
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711199.017
START DATE: 5.2.2017	START TIME: 1145	LATITUDE: 42° 44' 50.11
FINISH DATE: 5.2.2017	FINISH TIME: 1200	LONGITUDE: 73° 41' 03.68

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Brown black silt mixed with cinders, rags and scrap metal.	
3	0.0			FILL	Fill Material: Broken concrete fragments	
4				FILL		
5	0.0			FILL	Fill Material: Broken concrete fragments and bricks.	
6				FILL		
7	0.0			FILL	Fill Material: Broken concrete fragments and bricks mixed in black silt matrix.	
8				FILL		
9	0.0			FILL	Fill Material: Brick fragments, sheet metal, black silt and white ashes.	
10				FILL		
11	0.0	TP16(50) (11-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



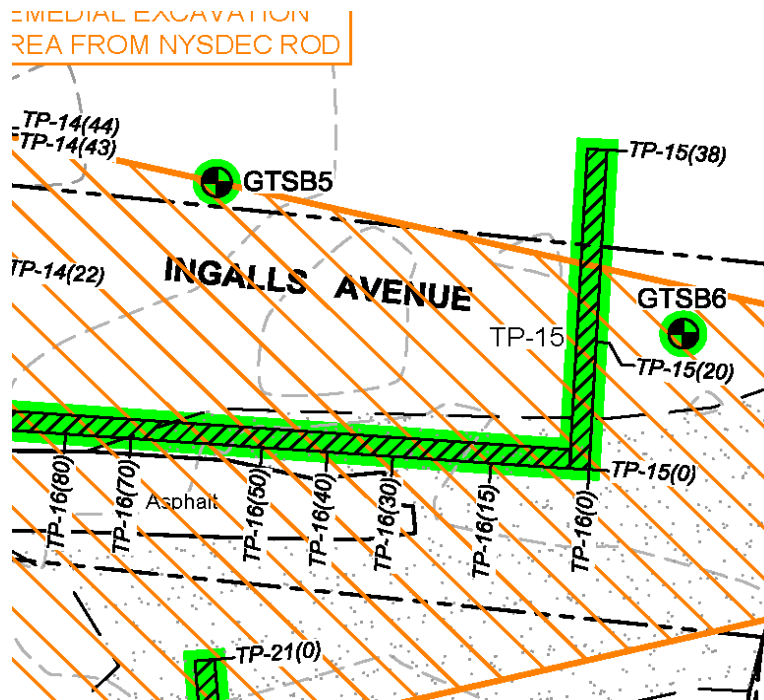
Test Pit Log

TP16(40)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(40)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426897.847
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711209.472
START DATE: 5.2.2017	START TIME: 1155	LATITUDE: 42° 44' 50.10
FINISH DATE: 5.2.2017	FINISH TIME: 1200	LONGITUDE: 73° 41' 03.54

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Bricks and cinders mixed in black silt matrix.	
3	0.0			FILL	Fill Material: Broken concrete fragments	
4				FILL	Fill Material: Broken concrete fragments and bricks.	
5	0.0			FILL	Fill Material: Layer of black silt. Layer of white ash.	
6						
7	0.0	TP16(40) (6-7)		FILL	Fill Material: Layer of black silt. Trace concrete and bricks	
8				FILL	Fill Material: Layer of black silt.	
9	0.0			FILL	Fill Material: Broken concrete fragments and bricks mixed in black silt matrix.	
10				FILL	Fill Material: Brown orange cinders and ash in horizontal layer.	
11	0.0	TP16(40) (11-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12				BOTTOM OF TEST PIT EXCAVATION		
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



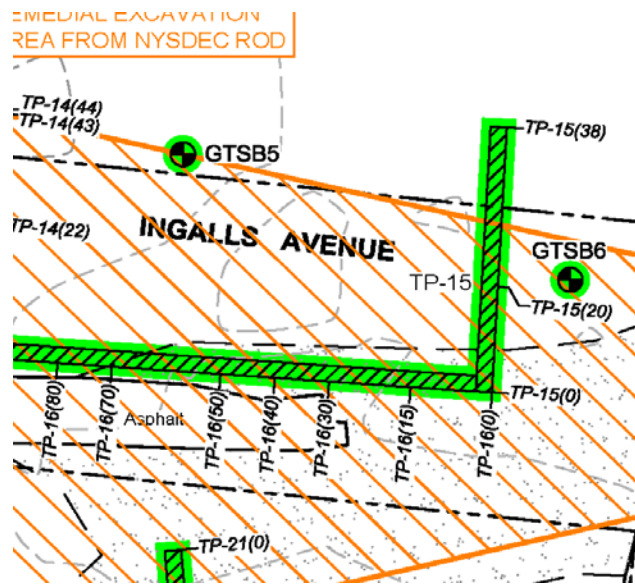
Test Pit Log

TP16(30)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(30)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426896.928
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711219.181
START DATE: 5.2.2017	START TIME: 1155	LATITUDE: 42° 44' 50.09
FINISH DATE: 5.2.2017	FINISH TIME: 1200	LONGITUDE: 73° 41' 03.41

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Bricks and cinders mixed in black silt matrix.	
3	0.0			FILL	Fill Material: Broken concrete fragments	
4				FILL	Fill Material: Broken concrete fragments and bricks.	
5	0.0			FILL	Fill Material: Layer of black silt. Layer of white ash.	
6				FILL	Fill Material: Layer of black silt.	
7	0.0			FILL	Fill Material: Layer of black silt.	
8				FILL	Fill Material: Layer of black silt.	
9	0.0			FILL	Fill Material: Broken concrete fragments and bricks.	
10				FILL	Fill Material: Brown orange cinders and ash in horizontal layer.	
11	0.0			FILL		
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



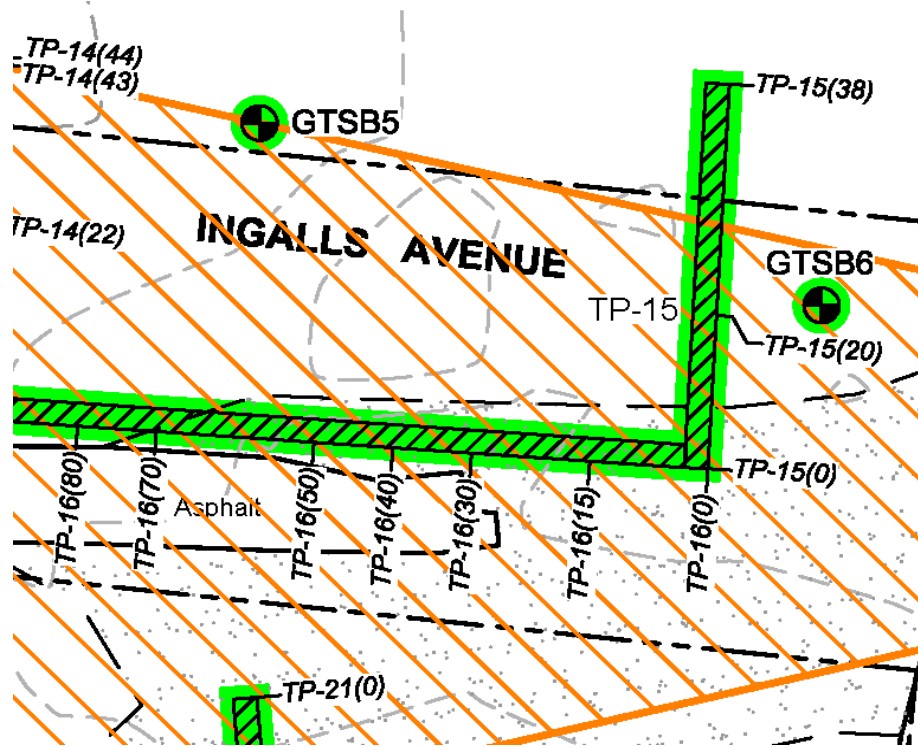
Test Pit Log

TP16(0)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(0)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26.54'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426895.837
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711249.074
START DATE: 5.2.2017	START TIME: 1015	LATITUDE: 42° 44' 50.07
FINISH DATE: 5.2.2017	FINISH TIME: 1030	LONGITUDE: 73° 41' 03.01

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Sand with Silt and Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Dense layer of brown silt and bricks. Layer of broken concrete fragments mixed with silt.	
3	0.0			FILL	Fill Material: Layer of silty sand, trace brick fragments. Orange red silt layer.	
4				FILL		
5	0.0			FILL	Fill Material: Layers of ash, clinkers, cobbles, mixed in silt matrix. Orange red silt layer.	
6				FILL		
7	0.0			FILL		
8				FILL	Fill Material: Layers of ash, clinkers, cobbles, mixed in silt matrix. Orange red silt layer.	
9	0.0			FILL		
10				FILL	Fill Material: Layers of ash, clinkers, cobbles, mixed in silt matrix.	
11	0.0					
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



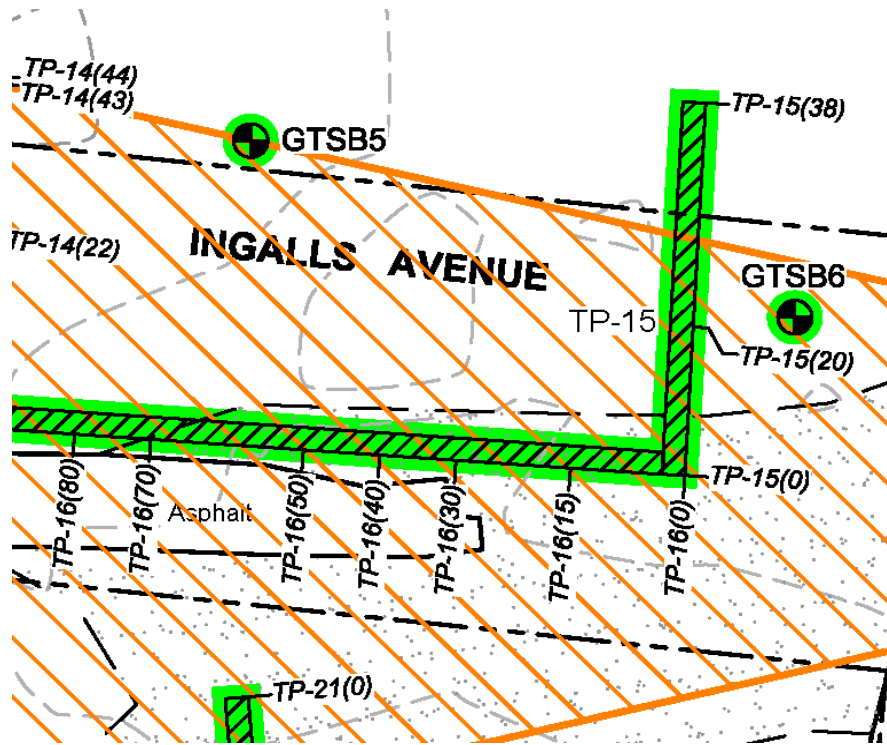
Test Pit Log

TP16(15)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP16(16)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426896.06
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711234.113
START DATE: 5.1.2017	START TIME: 1050	LATITUDE: 42° 44' 50.08
FINISH DATE: 5.1.2017	FINISH TIME: 1055	LONGITUDE: 73° 41' 03.21

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: Layer of broken concrete fragments is silt matrix. Layer of white ash.	
3	0.0			FILL	Fill Material: Layer of white ash.	
4				FILL	Fill Material: Layer of black silt. Layer of white ash.	
5	0.0			FILL	Fill Material: Layer of black silt.	
6						
7	0.0	TP16(15) (7-8)		FILL	Fill Material: Layers of white ash, broken rock fragments, bricks, loose wire, sheet metal.	
8				FILL	Fill Material: Layer of black silt.	
9	0.0					
10				FILL	Fill Material: Layers of ash, clinkers, cobbles, mixed in silt matrix.	
11	0.0					
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



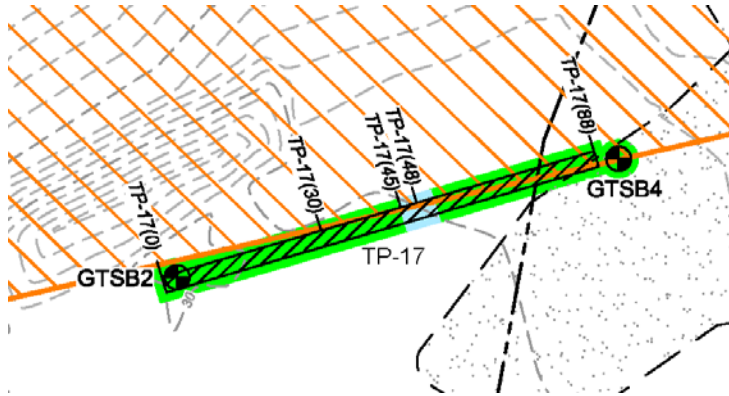
Test Pit Log

TP17(0)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP17(0)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426819.4536
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711077.5472
START DATE: 5.4.2017	START TIME: 910	LATITUDE: 42° 44' 49.34
FINISH DATE: 5.4.2017	FINISH TIME: 920	LONGITUDE: 73° 41' 05.32

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown. Fill Material: White ash in horizontal layer.	
2				FILL	Fill Material: White ash in horizontal layer.	
3	0.0			FILL	Fill Material: Red bricks in brown sand matrix, trace white and gray ash.	
4				FILL	Fill Material: White ash in horizontal layer.	
5	0.0			FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
6					Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
7	0.0			FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
8					Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
9	0.0			FILL		
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0	TP17(0) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12					BOTTOM OF TEST PIT EXCAVATION	
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



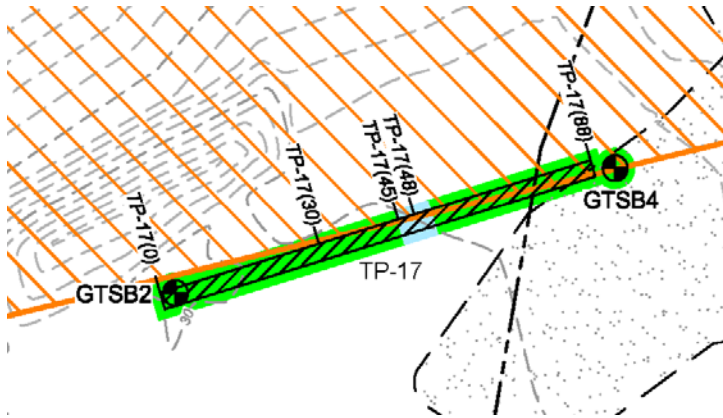
Test Pit Log

TP17(30)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP17(30)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426828.016
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711107.177
START DATE: 5.4.2017	START TIME: 910	LATITUDE: 42° 44' 49.42
FINISH DATE: 5.4.2017	FINISH TIME: 920	LONGITUDE: 73° 41' 04.92

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: White ash in horizontal layer.	
3	0.0			FILL	Fill Material: White ash in horizontal layer.	
4				FILL	Fill Material: Red bricks in brown sand matrix, trace white and gray ash.	
5	0.0			FILL	Fill Material: White ash in horizontal layer.	
6		TP17(30) (5-6)		FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
7	0.0			FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
8				FILL	Fill Material: Brown coarse sand and rounded gravel.	
9	0.0			FILL	Fill Material: Brown coarse sand and rounded gravel.	
10				FILL	Fill Material: Gray ashes, slag, coal fragments, shale fragments in gray and brown silt.	
11	0.0	TP17(30) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Suite N
Ithaca New York 14850



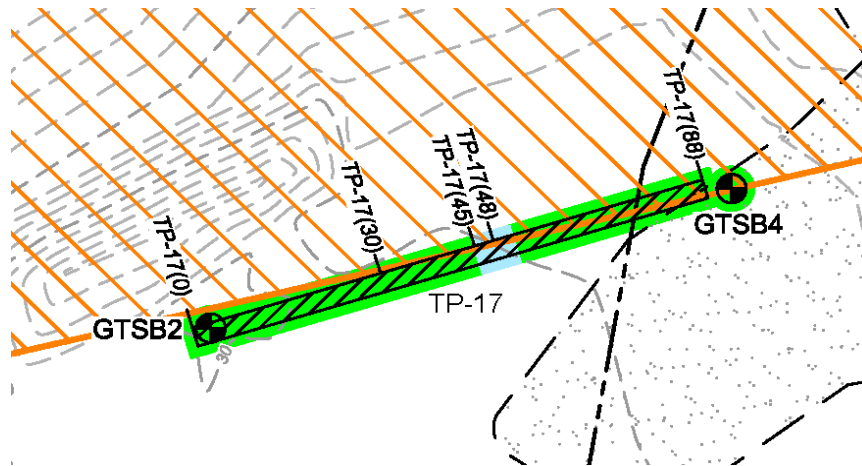
Test Pit Log

TP17(45)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP17(45)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426832.202
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711121.314
START DATE: 5.4.2017	START TIME: 950	LATITUDE: 42° 44' 49.46
FINISH DATE: 5.4.2017	FINISH TIME: 1000	LONGITUDE: 73° 41' 04.73

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown.	
2				FILL	Fill Material: White ash in horizontal layer.	
3	0.0			FILL	Fill Material: White ash in horizontal layer. Trace brick fragments.	
4				FILL	Fill Material: Red bricks in brown sand matrix, trace white and gray ash.	
5	0.0			FILL	Fill Material: White ash in horizontal layer.	
6				FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
7	0.0			FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
8				FILL	Fill Material: Brown coarse sand and rounded gravel.	
9	0.0			FILL	Fill Material: Gray ashes, slag, coal fragments, shale fragments in gray and brown silt.	
10						
11	0.0	TP17(45) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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1301 Trumansburg Road
Suite N
Ithaca New York 14850



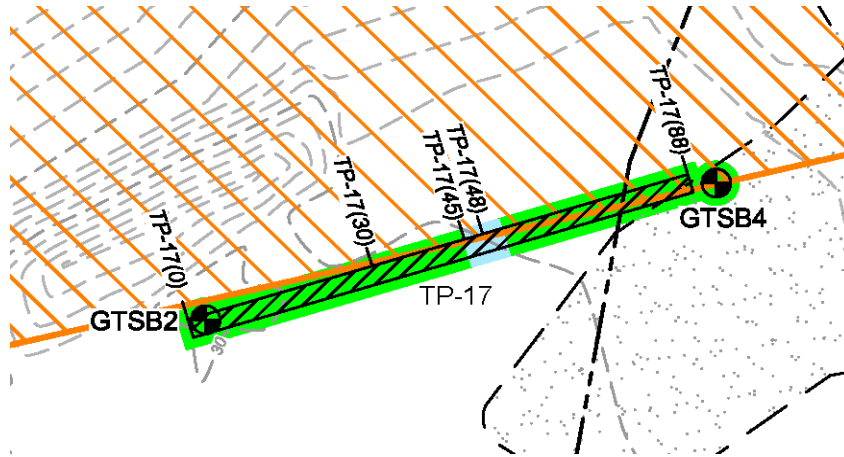
Test Pit Log

TP17(48)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP17(48)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426833.243
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711124.288
START DATE: 5.4.2017	START TIME: 1000	LATITUDE: 42° 44' 49.47
FINISH DATE: 5.4.2017	FINISH TIME: 1010	LONGITUDE: 73° 41' 04.69

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Gravel; moist; loose; dark brown.</p> <p>Fill Material: White ash in horizontal layer. Gray silt and ash. Bottles.</p>	
2				FILL	<p>Fill Material: White ash in horizontal layer. Trace brick fragments.</p>	
3	0.0			FILL	<p>Fill Material: Red bricks in brown sand matrix, trace white and gray ash.</p>	
4				FILL	<p>Fill Material: White ash in horizontal layer.</p>	
5	0.0			FILL	<p>Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.</p>	
6					<p>Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.</p>	
7	0.0					
8				FILL	<p>Fill Material: Brown wood fibers in compressed, dense layer. Trace hydrocarbon-like odor.</p>	Based on the physical characteristics (brown compressed dense wood fibers), and on the naphthalene-like odor, this material is assumed to be a MGP-related residual.
9	28.6	TP17(48) (8-9)				
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



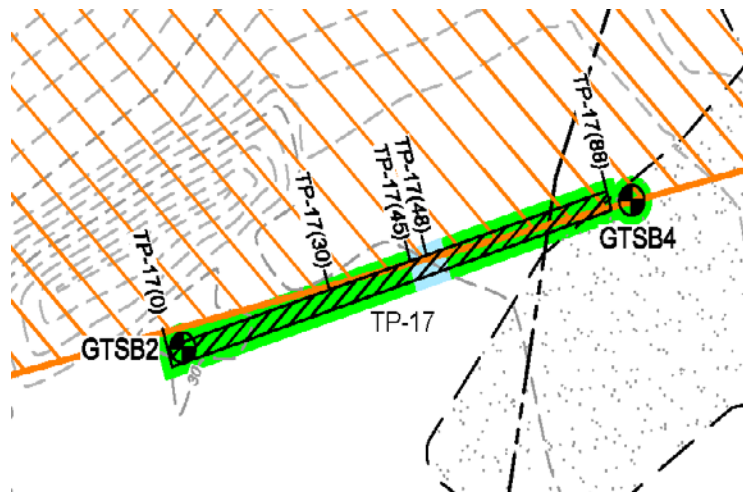
Test Pit Log

TP17(88)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP17(88)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 26'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426842.7671
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711155.5243
START DATE: 5.4.2017	START TIME: 1050	LATITUDE: 42° 44' 49.56
FINISH DATE: 5.4.2017	FINISH TIME: 1100	LONGITUDE: 73° 41' 04.27

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	<p>Fill Material: Gravel; moist; loose; dark brown. Trace bricks.</p> <p>Fill Material: White ash in horizontal layer. Gray shale fragments, trace clinkers and coal.</p>	
2				FILL	<p>Fill Material: White ash in horizontal layer. Trace brick fragments.</p>	
3	0.0			FILL	<p>Fill Material: Red bricks in brown sand matrix, trace white and gray ash.</p>	
4				FILL	<p>Fill Material: White ash in horizontal layer.</p>	
5	0.0			FILL	<p>Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt. Bottles and broken glass.</p>	
6					<p>Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.</p>	
7	0.0			FILL	<p>Fill Material: Brown coarse sand and rounded gravel.</p>	
8						
9	0.0					
10				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
11	0.0	TP17(88) (10-12)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
12						
13					BOTTOM OF TEST PIT EXCAVATION	
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



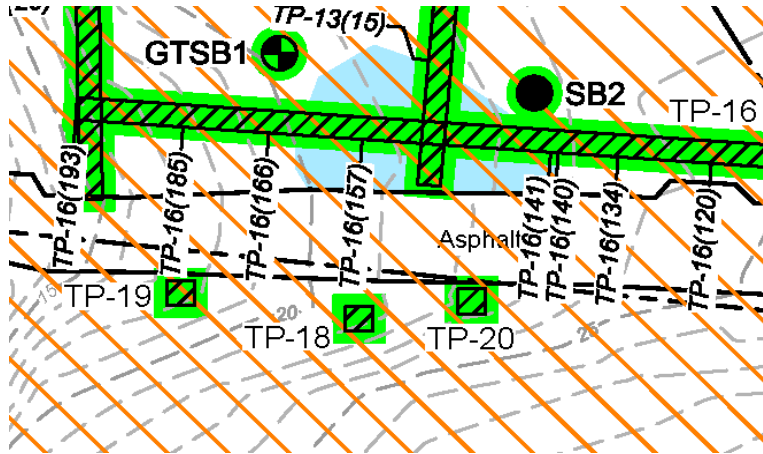
Test Pit Log

TP18

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP18	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 20.57'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426881.81
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711086.2568
START DATE: 5.3.2017	START TIME: 1540	LATITUDE: 42° 44' 49.95
FINISH DATE: 5.3.2017	FINISH TIME: 1550	LONGITUDE: 73° 41' 05.19

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Trace brick fragments, cinders and ash in brown soil matrix.	
2				FILL	Fill Material: Trace brick fragments, cinders and ash in brown soil matrix.	
3	0.0	TP18 (3-4)		FILL	Fill Material: Trace brick fragments, cinders and ash in brown soil matrix.	
4				FILL		
5	0.0					
6				SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
7					BOTTOM OF TEST PIT EXCAVATION	
8						
9						
10						
11						
12						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals



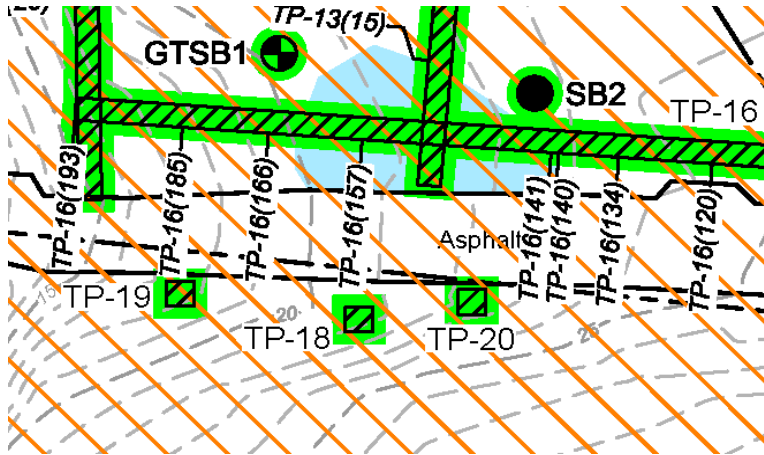
Test Pit Log

TP19

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP19	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 17.61'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426885.1941
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711063.1802
START DATE: 5.3.2017	START TIME: 1555	LATITUDE: 42° 44' 49.99
FINISH DATE: 5.3.2017	FINISH TIME: 1600	LONGITUDE: 73° 41' 05.50

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
2						
3	0.0	TP19 (3-4)		SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
4						
5	0.0			SP - SM	(SP/SM) Narrowly Graded Sand with Silt and Gravel; 80% fine sand; 15% round and subround gravel; 5% rounded cobbles; - 5% non-plastic fines; moist; loose; dark brown.	
6						
BOTTOM OF TEST PIT EXCAVATION						
7						
8						
9						
10						
11						
12						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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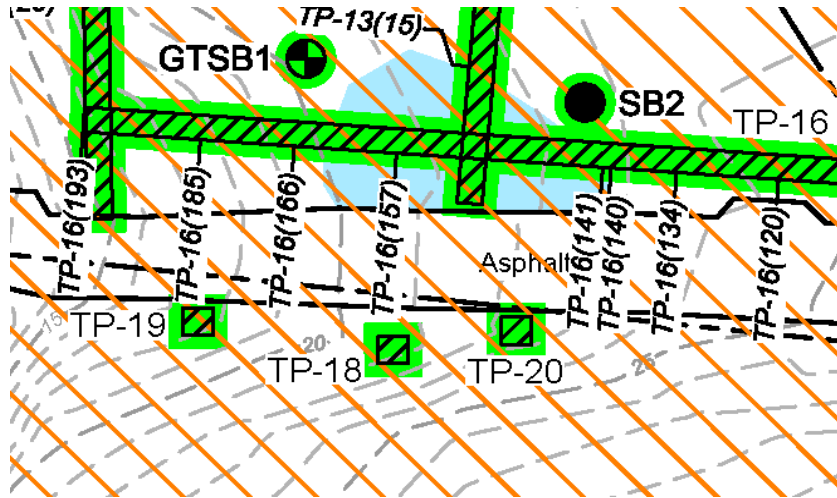
Test Pit Log

TP20

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP20	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 22.3'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426884.1962
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711100.9274
START DATE: 5.3.2017	START TIME: 1600	LATITUDE: 42° 44' 49.98
FINISH DATE: 5.3.2017	FINISH TIME: 1610	LONGITUDE: 73° 41' 05.00

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Trace brick fragments, cinders and ash in brown soil matrix.	
2				FILL	Fill Material: Trace brick fragments, cinders and ash in brown soil matrix.	
3	0.0	TP20 (3-4)		FILL	Fill Material: Trace brick fragments, cinders and ash in brown soil matrix.	
4						
5	0.0					
6						
BOTTOM OF TEST PIT EXCAVATION						
7						
8						
9						
10						
11						
12						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals

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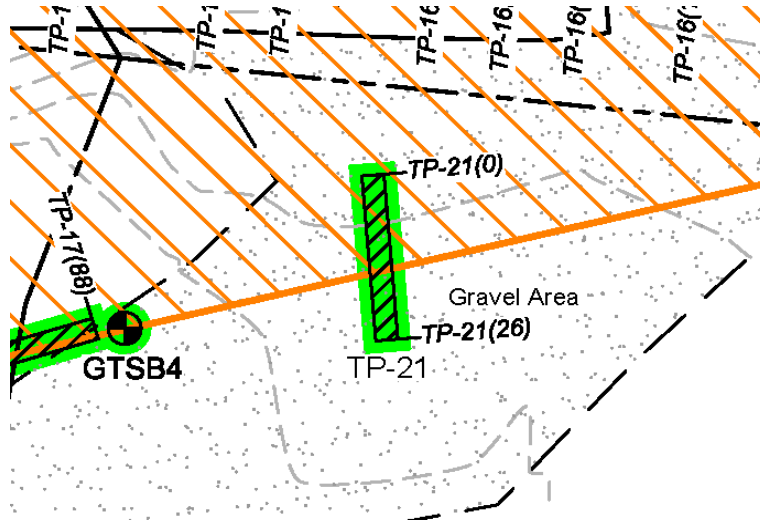
Test Pit Log

TP21(0)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP21(0)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 24.74'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426864.2755
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711193.316
START DATE: 5.4.2017	START TIME: 750	LATITUDE: 42° 44' 49.77
FINISH DATE: 5.4.2017	FINISH TIME: 800	LONGITUDE: 73° 41' 03.76

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Gravel; moist; loose; dark brown. Trace bricks.	
2				FILL	Fill Material: White ash in horizontal layer. Gray shale fragments, trace clinkers and coal. Broken and whole red bricks.	
3	0.0			FILL	Fill Material: White ash in horizontal layer. Trace brick fragments.	
4				FILL	Fill Material: Red bricks in brown sand matrix, trace white and gray ash. Bottles and glass fragments.	
5	0.0			FILL	Fill Material: White ash in horizontal layer.	
6				FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt. Bottles and broken glass.	
7	0.0			FILL	Fill Material: Gray cinders, slag, coal fragments, shale fragments in gray and brown silt.	
8				FILL	Fill Material: Brown coarse sand and rounded gravel.	
9	0.0			FILL	Fill Material: Brown coarse sand and rounded gravel. Trace gray and white ash.	
10				FILL	Fill Material: Brown coarse sand and rounded gravel. Trace gray and white ash.	
11	0.0	TP21(0) (10-12)		FILL	Fill Material: White ash in horizontal layer.	
12					BOTTOM OF TEST PIT EXCAVATION	
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2 TEST PIT WIDTH: 4 Feet TEST PIT BACKFILL: Material Returned to Test Pit LABORATORY ANALYSES: Total Cyanide and Free Cyanide	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
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Comments:

Visible Evidence of MGP-Related Purifier Residuals

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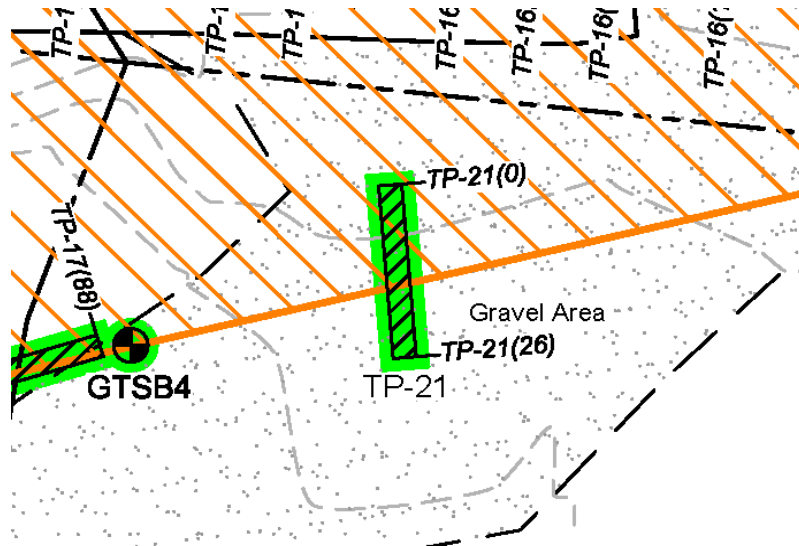
Test Pit Log

TP21(26)

GEI PROJECT NO: 116830 - 14083	TEST PIT DESIGNATION: TP21(26)	SURFACE ELEVATION END NAVD88:
CLIENT: National Grid	SITE LOCATION OR AREA: Ingalls Avenue OU2	SURFACE ELEVATION CENTER NAVD88: 28.61'
SITE NAME: Troy Smith Avenue MGP - OU2 Ingalls Avenue Area	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: James Edwards	EARTHWORK SUBCONTRACTOR: Abscope Environmental Services	NORTHING NAD83: 1426841.1812
DEPTH WATER ENCOUNTERED: Not Encountered	OPERATOR: Rick DenHaese	EASTING NAD83: 711195.2118
START DATE: 5.4.2017	START TIME: 800	LATITUDE: 42° 44' 49.54
FINISH DATE: 5.4.2017	FINISH TIME: 830	LONGITUDE: 73° 41' 03.74

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1	0.0			FILL	Fill Material: Black silt and gravel. Trace bricks.	
2				FILL	Fill Material: Black silt in horizontal layers. Trace brick fragments. Bottles.	
3	0.0	TP21(26) (2.5-3.5)		FILL	Fill Material: Black silt in horizontal layers. Trace brick fragments.	
4				FILL	Fill Material: White ash in horizontal layer. Layer is 5 feet thick.	
5	0.0					
6				FILL	Fill Material: White ash in horizontal layer. Layer is 5 feet thick.	
7	0.0					
8						
9	0.0			FILL	Fill Material: Sandy brown silt, some cobbles, some bricks, trace metal debris, whole stone foundation blocks.	
10						
11	0.0	TP21(26) (10-12)		FILL	Fill Material: White ash in horizontal layer.	
12						
BOTTOM OF TEST PIT EXCAVATION						
13						
14						

Comments: TEST PIT LENGTH: Plan View - Page 2	Visible Evidence of MGP-Related Purifier Residuals	GEI Consultants, Inc., P.C. 1301 Trumansburg Road Suite N Ithaca, New York 14850
TEST PIT WIDTH: 4 Feet		
TEST PIT BACKFILL: Material Returned to Test Pit		
LABORATORY ANALYSES: Total Cyanide and Free Cyanide		



Comments:

Visible Evidence of MGP-Related Purifier Residuals

Borelogs

BORING INFORMATION		EASTING (ft): 711075.8687	BORING GTSB1 PAGE 1 of 2
NORTHING (ft): 1426917.3581	GROUND SURFACE EL. (ft): 20.43	DATE START/END: 5/11/2017 - 5/11/2017	
VERTICAL DATUM: NAVD 88	TOTAL DEPTH (ft): 24.3	DRILLING COMPANY: Geologic, Inc.	
LOGGED BY: Garrett Schmidt		DRILLER NAME: Steve Laramee	
		RIG TYPE: Truck Mounted HSA	

DRILLING INFORMATION			
HAMMER TYPE:	CASING I.D./O.D.: NA/ NA	CORE BARREL TYPE:	
AUGER I.D./O.D.: 4.25 inch / NA	DRILL ROD O.D.: NA	CORE BARREL I.D./O.D.: NA / NA	
DRILLING METHOD: Hollow Stem Auger			
WATER LEVEL DEPTHS (ft): Not measured			

ABBREVIATIONS:	Pen. = Penetration Length Rec. = Recovery Length RQD = Rock Quality Designation = Length of Sound Cores > 4 in / Pen., % WOR = Weight of Rods WOH = Weight of Hammer	S = Split Spoon Sample C = Core Sample U = Undisturbed Sample SC = Sonic Core DP = Direct Push Sample HSA = Hollow-Stem Auger	Qp = Pocket Penetrometer Strength Sv = Pocket Torvane Shear Strength LL = Liquid Limit PI = Plasticity Index PID = Photoionization Detector I.D./O.D. = Inside Diameter/Outside Diameter	NA, NM = Not Applicable, Not Measured Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.
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Elev. (ft)	Depth (ft)	Sample Information					PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD						
20	5	S1	0 to 2	24/11	6-4-3-5	22.1	GTSB-1 (2.0-4.0)	FILL	FILL	S1: FILL material: NARROWLY GRADED WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, ash, brick and glass fragments; moist. Dark blackish-brown. Slight naphthalene-like odors.	
		S2	2 to 4	24/11	6-5-9-5	95.1				S2: FILL material: NARROWLY GRADED WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, ash, brick and glass fragments; moist. Dark blackish-brown. Very slight naphthalene-like odors. Sample collected.	
		S3	4 to 6	24/13	5-5-4-4	55.6				S3: FILL material: NARROWLY GRADED WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, ash, brick and glass fragments; moist. Dark blackish-brown. Very slight naphthalene-like odors.	
		S4	6 to 8	24/14	4-5-12-30	11.7				S4: FILL material: NARROWLY GRADED WITH SILT AND GRAVEL (SP-SM); with ~80% fine sand, ~15% fine to coarse sub-rounded gravel, ~5% non-plastic fines; few brick, coal, and ash fragments; moist. Dark blackish-brown. Sample collected.	
10	10	S5	8 to 10	24/12	27-12-13-9	20.1	GTSB-1 (10.0-12.0)	SAND, SILT AND GRAVEL	SAND, SILT AND GRAVEL	S5: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Dark brown.	
		S6	10 to 12	24/13	17-9-9-8	46.3				S6: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Dark brown. Sample collected.	
		S7	12 to 14	24/15	13-9-7-10	54.8				S7: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Dark brown.	
		S8	14 to 16	24/17	24-20-11-10	21.0				S8: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel; wet. Brown.	

NOTES:	PROJECT NAME: Troy Ingalls Ave PDI
	CITY/STATE: Troy, New York
	GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

NORTHING (ft): 1426917.3581
 GROUND SURFACE EL. (ft): 20.43
 VERTICAL DATUM: NAVD 88

EASTING (ft): 711075.8687
 DATE START/END: 5/11/2017 - 5/11/2017
 DRILLING COMPANY: Geologic, Inc.

**BORING
 GTSB1**
 PAGE 2 of 2

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
						20.9				
		S9	16 to 18	24/20 19	12-13-11-5	50.9 48.2		SAND AND SILT	S9: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel; wet. Brown.	
		S10	18 to 20	24/17	1-3-4-5	51.4 51.4	S10: SILTY SAND (SM); with ~5% non-plastic fines, ~85% fine sand, combined with SILT (ML) ~15% low-plasticity fines; wet. Dark grayish-brown.			
20		S11	20 to 22	24/12	7-6-6-7	16.0 16.2	S11: SILTY SAND (SM); with ~5% non-plastic fines, ~85% fine sand, combined with SILT (ML) ~15% low-plasticity fines; wet. Dark grayish-brown.			
		S12	22 to 24	24/14	4-4-12-50	8.3 9.1	S12: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.			
		S13	24 to 26	24/3	50-0.3-2-0.3	0.0	S13: (24-24.3 ft) weathered shale; wet. Gray. Hit refusal at 24.3 ft. bgs.			
							Bottom of boring at depth 24.3 ft.			

GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI
 CITY/STATE: Troy, New York
 GEI PROJECT NUMBER: 116830.1408.14083



BORING INFORMATION

NORTHING (ft): 1426820.8215
 GROUND SURFACE EL. (ft): 29.60
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 18.0
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711079.8978
 DATE START/END: 5/10/2017 - 5/10/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramée
 RIG TYPE: Truck Mounted HSA

**BORING
GTSB2**

PAGE 1 of 2

DRILLING INFORMATION

HAMMER TYPE: _____ CASING I.D./O.D.: NA/NA CORE BARREL TYPE: _____
 AUGER I.D./O.D.: 4.25 inch / NA DRILL ROD O.D.: NA CORE BARREL I.D./O.D. NA / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

ABBREVIATIONS: Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.
 WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector
 WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
5		S1	0 to 2	24/5	1-2-2-2	0.0	GTSB-2 (4.0-5.0)	FILL	S1: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many root, brick, glass, plastic, ash and coal fragments; moist. Dark blackish-brown.	
		S2	2 to 4	24/4	WOH-WOH-WOH-WOH	0.0			S2: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many root, brick, glass, plastic, ash and coal fragments; moist. Dark blackish-brown.	
		S3	4 to 6	24/7	WOH-WOH-WOH-WOH	0.0			S3: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many root, brick, glass, plastic, ash and coal fragments; moist. Dark blackish-brown.	
		S4	6 to 8	24/5	3-1-WOR-1	0.0			S4: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many root, brick, glass, plastic, ash and coal fragments; moist. Dark blackish-brown.	
		S5	8 to 10	24/7	WOH-1-2-2	0.0			S5: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many brick, coal, ash, glass, and wood fragments; moist. Blackish-brown.	
20										

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York

GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD. N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ_GEI DATA TEMPLATE 2011.GDT_6/1/17

NORTHING (ft): 1426820.8215
 GROUND SURFACE EL. (ft): 29.60
 VERTICAL DATUM: NAVD 88

EASTING (ft): 711079.8978
 DATE START/END: 5/10/2017 - 5/10/2017
 DRILLING COMPANY: Geologic, Inc.

**BORING
 GTSB2**
 PAGE 2 of 2

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
		S6	10 to 12	24/3	2-2-4-10	0.0	GTSB-2 (10.0-12.0)	FILL	S6: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many brick, coal, ash, glass, and wood fragments; moist. Blackish-brown.	
		S7	12 to 14	24/17	9-5-4-3	0.0			S7: FILL material: NARROWLY GRADED SAND WITH SILT (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many root fragments, few brick and coal fragments; moist. Brown.	
		S8	14 to 16	24/8	4-4-7-3	0.0			S8: NARROWLY GRADED SAND WITH SILT (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Brown.	
		S9	16 to 18	24/7	3-7-9-9	0.0			S9: NARROWLY GRADED SAND WITH SILT (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Brown.	
								SAND, GRAVEL, AND SILT		
									Hit refusal at 18.0 ft. bgs Bottom of boring at depth 18 ft.	

GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York

GEI PROJECT NUMBER: 116830.1408.14083



BORING

GTSB3

PAGE 1 of 2

BORING INFORMATION

NORTHING (ft): 1426967.2526
 GROUND SURFACE EL. (ft): 25.09
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 30.0
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711071.1424
 DATE START/END: 5/9/2017 - 5/9/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramée
 RIG TYPE: Truck Mounted HSA

DRILLING INFORMATION

HAMMER TYPE: _____ CASING I.D./O.D.: NA/NA CORE BARREL TYPE: _____
 AUGER I.D./O.D.: 4.25 inch / NA DRILL ROD O.D.: NA CORE BARREL I.D./O.D. NA / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

ABBREVIATIONS: Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit PI = Plasticity Index 30 inches to drive a 2-inch-O.D.
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core DP = Direct Push Sample PID = Photoionization Detector split spoon sampler.
 WOR = Weight of Rods HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter
 WOH = Weight of Hammer

Elev. (ft)	Depth (ft)	Sample Information					PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description	
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD							
20 5 10	5	S1	0 to 2	24/19	2-3-5-5	0.0	GTSB-3 (3.0-4.0)	FILL	FILL	S1: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, glass, plastic and metal fragments, few ash fragments; dry. Dark blackish-brown.		
		S2	2 to 4	24/14	6-4-5-3	0.0				S2: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, glass, plastic and metal fragments, few ash fragments; dry. Dark blackish-brown.		
		S3	4 to 6	24/12	3-2-3-5	0.0				S3: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, glass, plastic and metal fragments, few ash fragments; dry. Dark blackish-brown.		
		S4	6 to 8	24/5	4-4-4-4	0.1				S4: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, glass, plastic and metal fragments, few ash fragments; dry. Dark blackish-brown.		
		S5	8 to 10	24/7	3-6-4-5	0.0				S5: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~80% fine sand, ~15% fine to coarse sub-rounded gravel, ~5% nonplastic fines, many brick, coal, ash, metal fragments; moist. Dark blackish-brown.		
		S6	10 to 12	24/7	10-14-12-11	0.0				GTSB-3 (10.0-12.0)	SAND, GRAVEL, AND SILT	S6: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.
		S7	12 to 14	24/13	7-6-6-4	0.0						S7: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.
		S8	14 to 16	24/9	8-7-4-4	0.0						S8: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York

GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD. N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ_GEI DATA TEMPLATE 2011.GDT_6/1/17

NORTHING (ft): 1426967.2526
 GROUND SURFACE EL. (ft): 25.09
 VERTICAL DATUM: NAVD 88

EASTING (ft): 711071.1424
 DATE START/END: 5/9/2017 - 5/9/2017
 DRILLING COMPANY: Geologic, Inc.

**BORING
 GTSB3**
 PAGE 2 of 2

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
10						0.2				
		S9	16 to 18	24/17	6-5-4-5	0.3			S9: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
						0.0				
		S10	18 to 20	24/0	14-13-10-11	NA			S10: No Recovery	
						NA				
20		S11	20 to 22	24/14	8-13-9-6	0.8			S11: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel; wet. Brown.	
						0.3				
		S12	22 to 24	24/9	3-1-1-1	0.2			S12: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel; wet. Brown.	
						0.0				
		S13	24 to 26	24/15	13-4-27-50/2	0.4			S13 (0-12 in): NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel; wet. Brown.	
						0.6			S13 (12-17 in): NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel; wet. Dark grayish-brown.	
0	25								S13: Hit split-spoon refusal @ 25.2 ft. bgs - augered through.	
		S14	26 to 28	24/17	4-4-4-4	0.4			S14: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel, very few wood fragments; wet. Dark grayish-brown.	
						0.6				
		S15	28 to 30	24/15	2-3-7-9	0.2			S15: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel, very few wood fragments; wet. Dark grayish-brown.	
						0.3				
	30								Bottom of boring at depth 30 ft.	

SAND, GRAVEL, AND SILT

GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI
 CITY/STATE: Troy, New York
 GEI PROJECT NUMBER: 116830.1408.14083



BORING INFORMATION

NORTHING (ft): 1426842.8074
 GROUND SURFACE EL. (ft): 29.49
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 22.3
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711159.5269
 DATE START/END: 5/9/2017 - 5/9/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramée
 RIG TYPE: Truck Mounted HSA

BORING
GTSB4
 PAGE 1 of 2

DRILLING INFORMATION

HAMMER TYPE: _____ CASING I.D./O.D.: NA/ NA CORE BARREL TYPE: _____
 AUGER I.D./O.D.: 4.25 inch / NA DRILL ROD O.D.: NA CORE BARREL I.D./O.D. NA / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

ABBREVIATIONS: Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.
 WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector
 WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information					PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD						
		S1	0 to 2	24/17	3-2-1-1	0.0				FILL	S1: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) , with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and glass fragments; moist. Dark blackish-brown.
		S2	2 to 4	24/11	1-2-2-1	0.0			S2: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) , with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and glass fragments; moist. Dark blackish-brown.		
		S3	4 to 6	24/9	3-2-2-1	0.0			S3: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) , with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and glass fragments; moist. Dark blackish-brown.		
		S4	6 to 8	24/12	1-1-3-5	0.0			S4: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) , with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and glass fragments; moist. Dark blackish-brown.		
		S5	8 to 10	24/14	2-2-3-2	0.0			S5: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) , with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many coal, brick, and glass fragments; moist. Blackish-brown.		
		S6	10 to 12	24/12	5-2-4-3	0.0	GTSB-4 (10.0-12.0)		S6: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) , with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many coal, brick, and glass fragments; moist. Blackish-brown.		
		S7	12 to 14	24/19	3-2-3-2	0.0			S7: NARROWLY GRADED SAND WITH SILT WITH GRAVEL (SP-SM) , ~20% nonplastic fines, ~75% fine sand, ~5% fine to coarse sub-angular gravel; moist. Brown.		
		S8	14 to 16	24/13	4-7-3-6	0.0			S8: NARROWLY GRADED SAND WITH SILT WITH GRAVEL (SP-SM) , ~20% nonplastic fines, ~75% fine sand, ~5% fine to coarse sub-angular gravel; moist. Brown.		

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI
 CITY/STATE: Troy, New York
 GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD_N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ GEI DATA TEMPLATE 2011.GDT 6/1/17

NORTHING (ft): 1426842.8074
 GROUND SURFACE EL. (ft): 29.49
 VERTICAL DATUM: NAVD 88

EASTING (ft): 711159.5269
 DATE START/END: 5/9/2017 - 5/9/2017
 DRILLING COMPANY: Geologic, Inc.

**BORING
 GTSB4**
 PAGE 2 of 2

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
						0.0				
		S9	16 to 18	24/14	5-4-2-3	0.0		SAND, GRAVEL, AND SILT	S9: NARROWLY GRADED SAND WITH SILT WITH GRAVEL (SP-SM), ~20% nonplastic fines, ~75% fine sand, ~5% fine to coarse sub-rounded gravel; moist. Brown.	
		S10	18 to 20	24/20	2-3-2-11	0.0			S10: (0-0.6 in) NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), ~20% nonplastic fines, ~75% fine sand, ~5% fine to coarse sub-rounded gravel; moist. Brown. S10: (0.6-2.0) NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), ~10% nonplastic fines, ~85% fine sand, ~5% fine to coarse sub-rounded gravel; moist. Grayish-brown.	
		S11	20 to 22	24/13	15-12-50-3	0.0			S11: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), ~15% nonplastic fines, ~80% fine sand, ~5% fine to coarse sub-angular gravel; moist-wet. Brown.	
						0.0				
									Hit refusal @ 22.3 ft. bgs Bottom of boring at depth 22.3 ft.	

GEI WOBURN STD. N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ GEI DATA TEMPLATE 2011.GDT 6/1/17

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI
 CITY/STATE: Troy, New York
 GEI PROJECT NUMBER: 116830.1408.14083



BORING INFORMATION

NORTHING (ft): 1426939.2516
 GROUND SURFACE EL. (ft): 25.12
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 22.9
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711195.1289
 DATE START/END: 5/9/2017 - 5/9/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramee
 RIG TYPE: Truck Mounted HSA

BORING

GTSB5

PAGE 1 of 2

DRILLING INFORMATION

HAMMER TYPE: _____ CASING I.D./O.D.: NA/NA CORE BARREL TYPE: _____
 AUGER I.D./O.D.: 4.25 inch / NA DRILL ROD O.D.: NA CORE BARREL I.D./O.D. NA / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

ABBREVIATIONS: Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.
 WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector
 WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
20 5 10	5	S1	0 to 2	24/9	10-7-5-4	0.0	GTSB-5 (3.0-4.0)	FILL	S1: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~75% fine sand, ~25% fine to coarse sub-angular gravel, many coal, brick, metal, glass, and plastic fragments; moist. Dark blackish-brown.	
		S2	2 to 4	24/6	3-4-3-4	0.0			S2: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~75% fine sand, ~25% fine to coarse sub-angular gravel, many coal, brick, metal, glass, and plastic fragments; moist. Dark blackish-brown.	
		S3	4 to 6	24/17	3-4-2-1	0.0			S3: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many coal, brick, metal, glass, and ash fragments; moist. Dark blackish-brown.	
		S4	6 to 8	24/8	2-3-2-2	0.3			S4: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many coal, brick, metal, glass, and ash fragments; moist. Dark blackish-brown.	
		S5	8 to 10	24/18	7-8-8-5	0.0	0.0	S5: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many coal, brick, metal, glass, and ash fragments; moist. Dark blackish-brown.		
		S6	10 to 12	24/20	10-7-10-6	0.0	0.4	S6 (0-12 in): FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many coal, brick, metal, glass, and ash fragments; moist. Dark blackish-brown. S6: (12-24 in): FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM) ; with ~85% fine sand, ~15% fine to coarse sub-angular gravel; moist-wet. Brown.		
		S7	12 to 14	24/12	7-4-6-7	0.0	0.3	S7: NARROWLY GRADED SAND WITH SILT WITH GRAVEL (SP-SM) ; ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist-wet. Brown.		
		S8	14 to 16	24/0	7-5-4-2	NA		S8: No Recovery		

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York

GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD_N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ_GEI DATA TEMPLATE 2011.GDT_6/1/17

**BORING
GTSB5**
PAGE 2 of 2

NORTHING (ft): 1426939.2516 **EASTING (ft):** 711195.1289
GROUND SURFACE EL. (ft): 25.12 **DATE START/END:** 5/9/2017 - 5/9/2017
VERTICAL DATUM: NAVD 88 **DRILLING COMPANY:** Geologic, Inc.

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./Rec. (in)	Blows per 6 in. or RQD					
10						NA				
		S9	16 to 18	24/8	2-1-3-4	0.0			S9: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
						0.0				
		S10	18 to 20	24/14	3-3-7-4	1.8			S10: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel; wet. Grayish-brown.	
						0.3				
20		S11	20 to 22	24/15	WOH-3-4-7	2.4			S11: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel, few wood fragments; wet. Grayish-brown.	
						2.9				
		S12	22 to 24	24/0	11-50-.4	NA			Hit refusal at 22.9 ft bgs	
						NA				
									Bottom of boring at depth 22.9 ft.	

GEI WOBURN STD_N-E_NO WELL_SAMP_ID_TROY INGALLS PDI.GPJ GEI DATA TEMPLATE 2011.GDT 6/1/17

BORING INFORMATION

NORTHING (ft): 1426915.4817
 GROUND SURFACE EL. (ft): 26.65
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 24.0
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711266.2732
 DATE START/END: 5/8/2017 - 5/8/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramee
 RIG TYPE: Truck Mounted HSA

BORING**GTSB6**

PAGE 1 of 2

DRILLING INFORMATION

HAMMER TYPE:
 AUGER I.D./O.D.: 4.25 inch / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

CASING I.D./O.D.: NA / NA
 DRILL ROD O.D.: NA
 CORE BARREL TYPE:
 CORE BARREL I.D./O.D.: NA / NA

ABBREVIATIONS: Pen. = Penetration Length
 Rec. = Recovery Length
 RQD = Rock Quality Designation
 = Length of Sound Cores > 4 in / Pen., %
 WOR = Weight of Rods
 WOH = Weight of Hammer
 S = Split Spoon Sample
 C = Core Sample
 U = Undisturbed Sample
 SC = Sonic Core
 DP = Direct Push Sample
 HSA = Hollow-Stem Auger
 Qp = Pocket Penetrometer Strength
 Sv = Pocket Torvane Shear Strength
 LL = Liquid Limit
 PI = Plasticity Index
 PID = Photoionization Detector
 I.D./O.D. = Inside Diameter/Outside Diameter
 NA, NM = Not Applicable, Not Measured
 Blows per 6 in.: 140-lb hammer falling
 30 inches to drive a 2-inch-O.D.
 split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./Rec. (in)	Blows per 6 in. or RQD					
		S1	0 to 2	24/20	6-6-6-11	0.0				S1: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, ash, coal, and glass fragments; dry. Dark blackish-brown.
		S2	2 to 4	24/19	8-11-7-4	0.0				S2: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, ash, coal, and glass fragments; dry. Dark blackish-brown.
	5	S3	4 to 6	24/8	2-5-3-6	0.0	GTSB-6 (4.0-6.0)		FILL	S3: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~75% fine sand, ~25% fine to coarse sub-rounded gravel, many brick, coal, glass, and root fragments; moist. Blackish-brown.
	20	S4	6 to 8	24/17	9-10-14-15	0.0				S4: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel, many brick and coal fragments, few ash fragments; moist.
		S5	8 to 10	24/21	22-21-16-17	0.0				S5: FILL material: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel; moist. Dark brown.
	10	S6	10 to 12	24/17	20-15-12-12	0.0	GTSB-6 (10.0-12.0)		SAND AND GRAVEL	S6: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel; moist. Dark brown.
		S7	12 to 14	24/19	15-20-37-41	0.0				S7: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel; moist. Dark brown.
		S8	14 to 16	24/17	3-17-12-14	0.0				S8: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel; moist. Dark brown.

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York

GEI PROJECT NUMBER: 116830.1408.14083



NORTHING (ft): 1426915.4817
 GROUND SURFACE EL. (ft): 26.65
 VERTICAL DATUM: NAVD 88

EASTING (ft): 711266.2732
 DATE START/END: 5/8/2017 - 5/8/2017
 DRILLING COMPANY: Geologic, Inc.

**BORING
 GTSB6**
 PAGE 2 of 2

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
						0.0				
10		S9	16 to 18	24/17	25-27-12-12	0.0		SAND AND GRAVEL	S9: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-rounded gravel; moist. Dark brown.	
		S10	18 to 20	24/6	21-17-12-14	0.0			S10: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-angular gravel; wet. Dark brown.	
20		S11	20 to 22	24/14	6-4-4-6	0.0			S11: NARROWLY GRADED SAND WITH GRAVEL (SP-SM); with ~80% fine sand, ~20% fine to coarse sub-angular gravel; wet. Dark brown.	
		S12	22 to 24	24/0	12-6-11-26	0.0			S12: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, with ~80% fine sand, ~15% fine to coarse sub-angular gravel; wet. Dark brown.	
						0.0		SAND, GRAVEL, AND SILT	Hit refusal at 24.0 ft bgs Bottom of boring at depth 24 ft.	
25										
0										
30										

GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI
 CITY/STATE: Troy, New York
 GEI PROJECT NUMBER: 116830.1408.14083



BORING INFORMATION

NORTHING (ft): 1426954.7581
 GROUND SURFACE EL. (ft): 24.93
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 24.2
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711128.619
 DATE START/END: 5/10/2017 - 5/10/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramee
 RIG TYPE: Truck Mounted HSA

BORING

SB1

PAGE 1 of 2

DRILLING INFORMATION

HAMMER TYPE: _____ CASING I.D./O.D.: NA/ NA CORE BARREL TYPE: _____
 AUGER I.D./O.D.: 4.25 inch / NA DRILL ROD O.D.: NA CORE BARREL I.D./O.D. NA / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

ABBREVIATIONS: Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.
 WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector
 WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information					PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD						
20 5 10	5	S1	0 to 2	24/20	3-5-6-4	0.0	SB-1 (3.0-4.0)	FILL		S1: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, glass, coal, ash, metal, and root fragments; dry-moist. Dark blackish-brown.	
		S2	2 to 4	24/15	3-3-3-2	0.0				S2: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, glass, coal, ash, metal, and root fragments; dry-moist. Dark blackish-brown.	
		S3	4 to 6	24/14	3-1-2-1	0.0				S3: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, glass, coal, ash, metal, and root fragments; dry-moist. Dark blackish-brown.	
		S4	6 to 8	24/18	2-3-4-5	0.0				S4: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, ash, and brick fragments; dry-moist. Dark blackish-brown.	
		S5	8 to 10	24/17	4-6-5-7	0.0				S5: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, ash, and brick fragments; dry-moist. Dark blackish-brown.	
		S6	10 to 12	24/19	6-6-9-6	0.0				S6: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, few brick, coal, ash, and glass fragments; moist. Dark brown.	
		S7	12 to 14	24/15	6-6-5-5	0.0				S7: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Brown.	
		S8	14 to 16	24/14	6-5-6-9	0.0				S8: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) ; with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York

GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

NORTHING (ft): 1426954.7581
 GROUND SURFACE EL. (ft): 24.93
 VERTICAL DATUM: NAVD 88

EASTING (ft): 711128.619
 DATE START/END: 5/10/2017 - 5/10/2017
 DRILLING COMPANY: Geologic, Inc.

**BORING
 SB1**
 PAGE 2 of 2

Elev. (ft)	Depth (ft)	Sample Information				PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD					
						0.0				
		S9	16 to 18	24/6	9-13-14-14	0.1		SAND, SILT, AND GRAVEL	S9: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
						0.1				
		S10	18 to 20	24/14	8-7-4-5	0.0			S10: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
						0.0				
	20	S11	20 to 22	24/13	4-4-4-7	0.0			S11: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
						0.0				
		S12	22 to 24	24/5	32-50/.2-50-.2	0.2		SAND, SILT, AND GRAVEL	S12 (0-6 in): NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
						0.0			S12 (6-8 in): NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~15% nonplastic fines, ~80% fine sand, ~5% fine to coarse sub-rounded gravel (shale fragments); wet. Dark gray.	
						0.0			S12 (9-24 in): NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel; wet. Brown.	
	25								S13: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); with ~15% nonplastic fines, ~80% fine sand, ~5% fine to coarse sub-rounded gravel (shale fragments); wet. Dark gray.	
									Bottom of boring at depth 24.2 ft.	
	30									

GEI WOBURN STD. N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ GEI DATA TEMPLATE 2011.GDT 6/1/17

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI
 CITY/STATE: Troy, New York
 GEI PROJECT NUMBER: 116830.1408.14083




BORING INFORMATION		BORING	
NORTHING (ft): 1426912.0111	EASTING (ft): 711109.1307	SB2	
GROUND SURFACE EL. (ft): 22.41	DATE START/END: 5/10/2017 - 5/10/2017	PAGE 1 of 1	
VERTICAL DATUM: NAVD 88	DRILLING COMPANY: Geologic, Inc.		
TOTAL DEPTH (ft): 16.0	DRILLER NAME: Steve Laramee		
LOGGED BY: Garrett Schmidt	RIG TYPE: Truck Mounted HSA		

DRILLING INFORMATION			
HAMMER TYPE: _____	CASING I.D./O.D.: NA / NA	CORE BARREL TYPE: _____	
AUGER I.D./O.D.: 4.25 inch / NA	DRILL ROD O.D.: NA	CORE BARREL I.D./O.D.: NA / NA	
DRILLING METHOD: Hollow Stem Auger			
WATER LEVEL DEPTHS (ft): Not measured			

ABBREVIATIONS:

Pen. = Penetration Length	S = Split Spoon Sample	Qp = Pocket Penetrometer Strength	NA, NM = Not Applicable, Not Measured
Rec. = Recovery Length	C = Core Sample	Sv = Pocket Torvane Shear Strength	Blows per 6 in.: 140-lb hammer falling
RQD = Rock Quality Designation	U = Undisturbed Sample	LL = Liquid Limit	30 inches to drive a 2-inch-O.D.
= Length of Sound Cores > 4 in / Pen., %	SC = Sonic Core	PI = Plasticity Index	split spoon sampler.
WOR = Weight of Rods	DP = Direct Push Sample	PID = Photoionization Detector	
WOH = Weight of Hammer	HSA = Hollow-Stem Auger	I.D./O.D. = Inside Diameter/Outside Diameter	

Elev. (ft)	Depth (ft)	Sample Information					PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD						
20 5 10 10 15		S1	0 to 2	24/19	3-4-3-4	0.0	SB-2 (3.0-4.0)		FILL	S1: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, brick, ash, and glass fragments; moist. Dark blackish-brown.	
		S2	2 to 4	24/5	3-1-1-2	0.2				S2: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, brick, ash, and glass fragments; moist. Dark blackish-brown.	
		S3	4 to 6	24/6	2-1-1-1	0.1				S3: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, brick, ash, and glass fragments; moist. Dark blackish-brown.	
		S4	6 to 8	24/9	2-4-13-3	0.0				S4: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many coal, brick, ash, and glass fragments; moist. Dark blackish-brown.	
		S5	8 to 10	24/15	5-4-3-2	0.0	SB-2 (10.0-12.0)			S5: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Brown.	
		S6	10 to 12	24/7	5-5-5-5	0.0				S6: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist. Brown.	
		S7	12 to 14	24/17	6-5-5-6	0.0				S7: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist-wet. Brown.	
		S8	14 to 16	24/3	5-3-2-2	NA				S8: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% non-plastic fines; ~80% fine sand, ~15% fine to coarse sub-rounded gravel; moist-wet. Brown.	
										Bottom of boring at depth 16 ft.	

NOTES:	PROJECT NAME: Troy Ingalls Ave PDI	
	CITY/STATE: Troy, New York	
	GEI PROJECT NUMBER: 116830.1408.14083	

GEI WOBURN STD. N-E NO WELL_SAMP ID. TROY INGALLS PDI.GPJ. GEI DATA TEMPLATE 2011.GDT. 6/1/17

BORING INFORMATION

NORTHING (ft): 1426929.6272
 GROUND SURFACE EL. (ft): 22.569
 VERTICAL DATUM: NAVD 88
 TOTAL DEPTH (ft): 16.0
 LOGGED BY: Garrett Schmidt

EASTING (ft): 711102.6052
 DATE START/END: 5/10/2017 - 5/10/2017
 DRILLING COMPANY: Geologic, Inc.
 DRILLER NAME: Steve Laramee
 RIG TYPE: Truck Mounted HSA

BORING

SB3

PAGE 1 of 1

DRILLING INFORMATION

HAMMER TYPE: _____ CASING I.D./O.D.: NA / NA CORE BARREL TYPE: _____
 AUGER I.D./O.D.: 4.25 inch / NA DRILL ROD O.D.: NA CORE BARREL I.D./O.D.: NA / NA
 DRILLING METHOD: Hollow Stem Auger
 WATER LEVEL DEPTHS (ft): Not measured

ABBREVIATIONS: Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.
 WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector
 WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information					PID (ppm)	Analyzed Sample ID	Visual Impacts	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./Rec. (in)	Blows per 6 in. or RQD						
	0 to 2	S1	0 to 2	24/8	5-4-4-5	0.0				FILL	S1: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many brick, coal, ash, and glass fragments.
	2 to 4	S2	2 to 4	24/9	4-3-3-2	0.2			S2: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many brick, coal, ash, and glass fragments.		
	4 to 6	S3	4 to 6	24/5	4-3-3-3	0.0			S3: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~80% fine sand, ~15% fine to coarse sub-rounded gravel, many brick, coal, ash, and glass fragments.		
	6 to 8	S4	6 to 8	24/12	5-4-4-4	0.6			S4: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and ash fragments.		
	8 to 10	S5	8 to 10	24/15	2-5-4-4	0.1			S5: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and ash fragments.		
	10 to 12	S6	10 to 12	24/5	5-7-9-8	0.2	SB-3 (10.0-12.0)			S6: FILL material: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~75% fine sand, ~20% fine to coarse sub-rounded gravel, many brick, coal, and ash fragments.	
	12 to 14	S7	12 to 14	24/17	7-5-4-5	0.2				SAND, GRAVEL, AND SILT	S7: NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~5% nonplastic fines, ~85% fine sand, ~10% fine to coarse sub-rounded gravel; moist. Brown.
	14 to 16	S8	14 to 16	24/0	8-6-5-6	NA					S8: No Recovery
						NA					Bottom of boring at depth 16 ft.

NOTES:

PROJECT NAME: Troy Ingalls Ave PDI

CITY/STATE: Troy, New York










GEI PROJECT NUMBER: 116830.1408.14083



GEI WOBURN STD_N-E NO WELL_SAMP ID_TROY INGALLS PDI.GPJ_GEI DATA TEMPLATE 2011.GDT_6/1/17

Previous Borelogs and Test Pit Logs

Color Descriptions of Samples at Urban Impacted Sites

		RGB Color	Auto Cad Index
	NAPL SATURATED	255,0,0	10
	NAPL COATED MATERIAL	255,0,255	210
	SOLID NAPL	129,64,0	34
	NAPL BLEBS, GLOBS, SHEEN	255,191,0	40
	STAINING, ODOR	255,255,0	50
	INDUSTRIAL IMPACTS - (PETROLEUM OR OTHER UNNATURAL) SATURATION & SHEENS	0,191,255	140
	INDUSTRIAL IMPACTS - (PETROLEUM OR OTHER UNNATURAL) STAINING & ODORS	170,234,255	141
	WOOD CHIPS/BLUE DISCOLORATION/SULFER-LIKE ODOR	0,0,255	170
	NO OBSERVED IMPACTS	0,165,0	92

Note: In instances where multiple impacts are present, a combination of colors should be used (such as a color with cross hatching) to clearly identify where these co-mingled impacts are present.

2008-2009
Previous Exploration Logs
H2H – City of Troy

APPENDIX B

Remedial Investigation Data

HUDSON RIVER



LEGEND

- TP-1
- SS-1
- SB-1
- MW-1
- B1
- APPROXIMATE PROPERTY LINE
- PAVED ROADWAY
- BUILDING / STRUCTURE
- WATER BODY BOUNDARY
- FENCE LOCATION
- MAJOR CONTOUR LINE
- MINOR CONTOUR LINE
- BANKHOLE
- UTILITY POLE
- DIRECTION OF SURFACE WATER FLOW

- ### NOTES
- ALL INVESTIGATION LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE.
 - LOCATIONS FOR FOUR OFF-SITE BACKGROUND SURFACE SOIL SAMPLES TO BE DETERMINED WITH CITY AND NYSDEC CONCURRENCE DURING FIELD WORK MOBILIZATION.

DATE	REVISION RECORD/DESCRIPTION

DATE	REVISION RECORD/DESCRIPTION

DATE	REVISION RECORD/DESCRIPTION

DATE	REVISION RECORD/DESCRIPTION

PLAN SCALE IN FEET
0 37.5 75 140'

SITE INVESTIGATION LOCATIONS
CITY OF TROY
FUTURE INGALLS PARK SIR & RP PROJECT
RENEBLAGNE COUNTY, NY



MASSACHUSETTS LLC
ENGINEERS ARCHITECTS PLANNERS

FIGURE 3

Test Pit Data
H2H Associates - 2009

H2H Associates, LLC	179 River Street Troy, NY 12180	TEST PIT LOG	TP-1
PROJECT: Future Ingalls Park Project		Sheet: 1 of 1	
CLIENT: City of Troy, New York		Job No.: 490.00	
PURPOSE: Environmental Investigation		Meas. Pt. Elev:	
EXCAVATION CONTRACTOR: Land-Remediation Services, Inc.		Ground Elev.: 22.3	
EXCAVATOR: Jeff		Datum: Site	
GROUNDWATER DEPTH: Not Encountered		Date Started: 6.10.09	
		Date Finished: 6.10.09	
DATE OF MEASUREMENT:			
ORIENTATION: Southeast to Northwest		Geologist: Mark Williams	

Depth (feet)	Sample	Geologic Description	VOC Headspace (ppm)
		0 - 1.76': Concrete Washout material	6.2
2	TP-1 [1-2']	1.76 - 2': Bl FILL(cmf(+))SI, Cy\$); Strong odor; stained (FILL).	19.6
		2 -3': LtBr Cy\$a, mfS, sfG; freq. brick, metal & glass	15.6
		3 - 4.2': Gr fS, s\$, lcmfG; occ. to freq. bricks; medium dense ; dry (FILL).	13.2
4		4.2 - 6': GrmfS, acmfG; occ. cbl; hd; occ. to freq., bricks; dry (FILL).	10.1
		6 - 6.9':Bricks; a Gr cmf(+))S; layer dips toward Hudson River; dense; dry (FILL).	5.6
6		6.9 - >15.0': GrBr cmfG, lcmf(+))S; occ. to freq. rded cbls; no odor; no staining; no structure; no MGP waste; dry (FILL).	5.3
8			3.8
			9.9
10			16.4
			15.1
12			8.3
			7.4
14			9.8
			21.5
16			19.8
			14.2
			13.8
			5.1
			1.6
			1.5
		(FILL)	2.2
			15.0'
			1.9
			[7.29*]
		Total Depth = 15' Length = 19' Width = 8'	

H2H Associates, LLC	179 River Street Troy, NY 12180	TEST PIT LOG	TP-4
PROJECT: Future Ingalls Park Project		Sheet: 1 of 1	
CLIENT: City of Troy, New York		Job No.: 490.00	
PURPOSE: Environmental Investigation		Meas. Pt. Elev:	
EXCAVATION CONTRACTOR: Land-Remediation Services, Inc.		Ground Elev.: 24.1	
EXCAVATOR: Jeff		Datum: Site	
GROUNDWATER DEPTH: Not Encountered		Date Started: 6.10.09	
		Date Finished: 6.10.09	
DATE OF MEASUREMENT:			
ORIENTATION: North to South		Geologist: Mark Williams	

Depth (feet)	Sample	Geologic Description	VOC Headspace (ppm)
		0 - 1.8': Concrete Washout w/ occ. Fill	
		0.55 - 1.25': Black FILL; stained;freq. glass/metal in fS matrix; strong odor; stained (FILL);	158/140
	TP-4	layers deeper @ east end of TT-A.	576
2	[1-3']	1.25 - 2': LtBrcmfS,s(-) cmfG; freq. brick; occ. wire and metal pieces; cemented; dense; dry; strong odor; stained (FILL).	478
		2 - 5.0': Gr FILL (a(-) cmf(+))S; freq. brick/glass/metal frags; occ. ash; strong odor; occ. to frq. stained; no MGP-related waste (FILL).	3044
			310
4			250
			48
			42
		5 - 14.0': Br cm(+))fS, a(-) cmfG; coarsens with depth; occ. cinders and ash; medium dense to dense; odor ranges from weak to strong; no staining; no MGP-related waste (FILL).	240
6			225
			81
			72
		7.4: Top of "bank run" (BrcmfS, l\$, s(+)) cmfG; freq. rded, qtzitic cbles; less odor; no staining (FILL).	22
8			19
			20
			18
	TP-4	DkGCy\$ evident between 8.8 and 12.55'	597
10	[9-12']		310
			286
		11.5': Ash (Firebrick) & slag	713
12			621
			316
		Br cmfS, a cmf(+))G; rded to subrded; occ. to freq. qtzitic cbles; dense; mod. odor; no staining; no MGP waste.	437
14		(FILL)	14'
			[10.14*] 253
16		Total Depth = 14' Length = 21.2' Width 11.25'	

H2H Associates, LLC		179 River Street Troy, NY 12180	TEST PIT LOG	TP-6
PROJECT: Future Ingalls Park Project			Sheet: 1 of 1	
CLIENT: City of Troy, New York			Job No.: 490.00	
PURPOSE: Environmental Investigation			Meas. Pt. Elev:	
EXCAVATION CONTRACTOR: Land-Remediation Services, Inc.			Ground Elev.: 25.4	
EXCAVATOR: Jeff			Datum: Site	
GROUNDWATER DEPTH: Not Encountered			Date Started: 6.10.09	
			Date Finished: 6.10.09	
DATE OF MEASUREMENT:				
ORIENTATION: West to East			Geologist: Mark Williams	
Depth (feet)	Sample	Geologic Description	VOC Headspace (ppm)	
0		0 - 1.8': Concrete Washout w/ occ. Fill	N/a	
2		1.8 - 3.8': Black FILL; stained; freq. glass/metal in fS matrix; strong odor; stained (FILL); layers deeper @ east end of TT-A.	65/41	73
4		3.8 - 7.6': LtBrGr cndrs/ash/clinker (incinerator-type material); occ. Bk vitrified slag chunk; loose to med. dense; mod. odor; dry (FILL).	309	173
6		7.65': Top of "bank run" (BrcmfS, l\$, s cmfG; freq. rded cbls; less odor; no staining; no structure (FILL).	32.6 31.1	101
8		DkGCy\$ evident between 7.9 and 9.15'	64	75.6
10			70.5 68	205 197
12		11.75': Ash (Firebrick) & slag; a(+) mfS; sl. Odor; no staining (FILL).	61.7	46.7
		(FILL)	12.8'	93.6
14		Br cmfS, a cmf(+);G; rded to subrded; occ. to freq. qtzitic cbls; dense; mod. odor; no staining; no MGP waste. Total Depth = 12.8' Length = 18' Width = 9.25'		
16				

PROJECT: Future Ingalls Park Project	Sheet: 1 of 1
CLIENT: City of Troy, New York	Job No.: 490.00
PURPOSE: Environmental Investigation	Meas. Pt. Elev:
EXCAVATION CONTRACTOR: Land-Remediation Services, Inc.	Ground Elev.: 26.2
EXCAVATOR: Jeff	Datum: Site
GROUNDWATER DEPTH: Not Encountered	Date Started: 6.10.09
	Date Finished: 6.10.09
DATE OF MEASUREMENT:	
ORIENTATION: East to West	Geologist: Mark Williams

Depth (feet)	Sample	Geologic Description	VOC Headspace (ppm)
		0 - 0.9': Concrete Washout material	N/A
		0.9 - 3.3': Bl stained c(+)mfS; occ. to freq. bricks (2-3'); sl odor; medium dense; dry (FILL).	16
2			11.2 10.9
			4.3 4.0
4		3.3 - 5.6': Gr cmf(+) S, lcmfG; occ. cbl; sl. odor; no staining; med. dense; dry (FILL).	5.0
			2.6 2.4
6		5.6 - 6.45': Br cm(+)fS, l cmf(+)G; occ. cbl; no odor; no staining; medium dense; dry (FILL).	5.9
			2.1
8		6.45 - 9.25': LtGr cmf(+)S, l mfG; occ. cbl; dense; dry; no odor; no staining (FILL).	3.1
			2.9 2.4
10		9.25 - >15': Gr-Bl cmfG, l cmfS; occ. to freq. cbls; no odor; no staining; dense; dry.	1.3 1.2
			2.3
12			14.4
			9.2
14			2.9
			5.5
16			15.0' 5.4
			[11.15*]
		Total Depth = 15' Length = 27.9' Width = 7.5'	

TEST BORING LOGS

H2H Associates, LLC 179 River Street, Troy, N.Y. 12180 Tel. (518) 270-1620 - Fax (518) 270-1672				Test Boring Log			Boring No. MW-2
PROJECT: Future Ingalls Park						Sheet 1 of 2	
CLIENT: City of Troy, New York						Job No. 490.10	
DRILLING CONTRACTOR: SJB Services, Inc.						Meas. Pt Elev: 26.451	
PURPOSE: Remedial Investigation						Ground Elev: 24.077	
DRILLING METHOD: Hollow Stem Auger				SAMPLE	CORE	CASING	Datum: Site Datum
DRILL RIG TYPE: CME-550 X		TYPE		SS	---	Auger	Date Started: 6/19/09
GROUNDWATER DEPTH: 20.69'		DIAM.		2"O.D.	---	4¼" I.D.	Date Finished: 6/19/09
MEASURING POINT: Top of PVC Riser		WEIGHT		140#			Driller: Tom Farrell
DATE OF MEASUREMENT: 6/26/2009		FALL		30"			Inspector: Edward Molocznic
Depth (feet)	Sample Number	Blow Counts	Unified Classification	Graphic Log	Geologic Description		Remarks
2	S-1	woh/1			Dk Br-Tan mfS, s fG; occ. cndrs; v. loose; dry (FILL).		Rec. = 0.53' (PID HS = 1.9 / 53.4 PPM)
		1/2					Rec. = 0.62' (PID HS = 0.0 / 6.5 PPM)
4	S-2	2/2			GrBr mf(+)G, a cmfS; occ. Concrete pieces; loose; dry (FILL). Fill; BrGr mf G, a m(-)f S; occ. Brick/cinders and concrete pieces; loose; dry; no odors; no staining (FILL).		Rec. = 0.48' (PID HS = 0.5 / 20.1 PPM)
		3/7					Rec. = 0.64' (PID HS = 0.4 / 1.4 PPM)
6	S-3	3/6			Br-BI c(+)mfS, a m(-)fG; loose; dry; no odor; no staining (FILL).		Rec. = 0.44' (PID HS = 0.8 / 2.1 PPM)
		2/2					Rec. = 0.54' (PID HS = 0.2 / 2.1 PPM)
8	S-4	4/3			Lt-DkBr m(-)fS, a m(-)f G; med. dense; dry; no odor; no staining (FILL).		Rec. = 1.34' (PID HS = 0.1 / 1.0 PPM)
		5/2					Rec. = 1.06' (PID HS = 0.0 / 2.6 PPM)
10	S-5	27/49			Lt-DkBr m(-)fS, s m(-)fG; loose; dry; no odor; no staining.		Rec. = 0.76' (PID HS = 0.0 / 2.3 PPM)
		5/11					Rec. = 0.44' (PID HS = 0.1 / 1.4 PPM)
12	S-6	15/15			Lt-DkBr m(-)fS, l fG; loose to med. dense; dry; no odor; no staining.		Rec. = 1.06' (PID HS = 0.0 / 2.6 PPM)
		9/6					Rec. = 0.76' (PID HS = 0.0 / 2.3 PPM)
14	S-7	5/6			Lt-DkBr m(-)fS, s m(-)fG; loose; dry; no odor; no staining.		Rec. = 0.76' (PID HS = 0.0 / 2.3 PPM)
		3/8					Rec. = 0.44' (PID HS = 0.1 / 1.4 PPM)
16	S-8	5/3			Lt-DkBr m(-)fS, s m(-)fG; loose; dry; no odor; no staining.		Rec. = 1.06' (PID HS = 0.0 / 2.6 PPM)
		3/3					Rec. = 0.76' (PID HS = 0.0 / 2.3 PPM)
18	S-9	4/7			LtBr mf(+)S, tfG; med. Dense; dry; no odor; no staining.		Rec. = 0.76' (PID HS = 0.0 / 2.3 PPM)
		9/11					Rec. = 0.44' (PID HS = 0.1 / 1.4 PPM)
20	S-10	5/6			BrfS, t\$, s mf(+)G; med. dense; moist to wet (wet @ 18.32' bgs); no odor; no staining.		Rec. = 0.44' (PID HS = 0.1 / 1.4 PPM)
		5/5					

H2H Associates, LLC

179 River Street, Troy, New York 12180
Tel. (518) 270-1620 - Fax (518) 270-1672

Test Boring Log

Boring No. MW-2

PROJECT: Future Ingalls Park

Sheet 2 of 2

CLIENT: City of Troy, New York

Job No. 490.10

Depth (feet)	Sample Number	Blow Counts	Unified Classification	Graphic Log	Geologic Description	Remarks
22	S-11	5/4			Br-DkBr fS, t\$, s m(-)fG; loose; wet @ 20.69' (PVC).	Rec. = 1.11'
		4/5				(PID HS = 0.1 / 1.5 PPM)
24	S-12	5/3			LtBr mf(+)S, t fG; loose; wet.	Rec. = 1.14'
		2/2				(PID HS = 0.0 / 1.3 PPM)
26	S-13	5/4			BrBlk mf(+)S, s(+)Cy\$; med. dense; wet.	Rec. = 1.52'
		6/3				(PID HS = 0.0 / 7.1 PPM)
28	S-17	7/50			Rock frag. Ldged in spoon (weathered Shale)	Rec. = 2.00'
		4/2				(PID HS = 0.1 / 4.2 PPM)
30					End of Boring = 28' bgs	

Note: Drilling occurred in an area of Test Trench A, that was pre-excavated. This is not a true stratigraphic representation

MONITORING WELL INSTALLATION LOGS

H2H Associates, LLC 179 River Street, Troy, N.Y. 12180 Tel. (518) 270-1620 - Fax (518) 270-1672		WELL INSTALLATION LOG	MW-2
PROJECT: Future Ingalls Park		PROJECT NO.: 490.10	
CLIENT: City of Troy		DATE DRILLED: 6/19/09	
LOCATION: Troy, New York		DATE DEVELOPED: 6/24/09	
DRILLING CONTRACTOR: SJB Services, Inc.		PURPOSE: Environmental Monitoring Well Installation	
INSPECTOR: Mark A. Williams, PG			

Type of well: Environmental
 Static Water Level: 20.69' Date: 6/19/2009
 Measuring Point (M.P.): Top of PVC: 26.45'
 Total Depth of Well: 27' BGS
 Total Depth of Boring: 28' BGS

Drilling Method

Type: Hollow Stem Auger Diameter: 4 1/4" I.D.
 Casing: Steel

Sampling Method

Type: Split-Spoon Diameter: 2" O.D.
 Weight: NA Fall: NA
 Interval: Continuous

Riser Pipe Left in Place

Material: Schedule 40 PVC Diameter: 1" I.D.
 Length: 22' + (stick up 2.37') Joint Type: Flush, threaded

Screen

Material: Schedule 40 PVC Diameter: 2"
 Slot Size: 10-slot Length: 5 feet
 Stratigraphic Unit Screened: 22' - 27'

Filter Pack

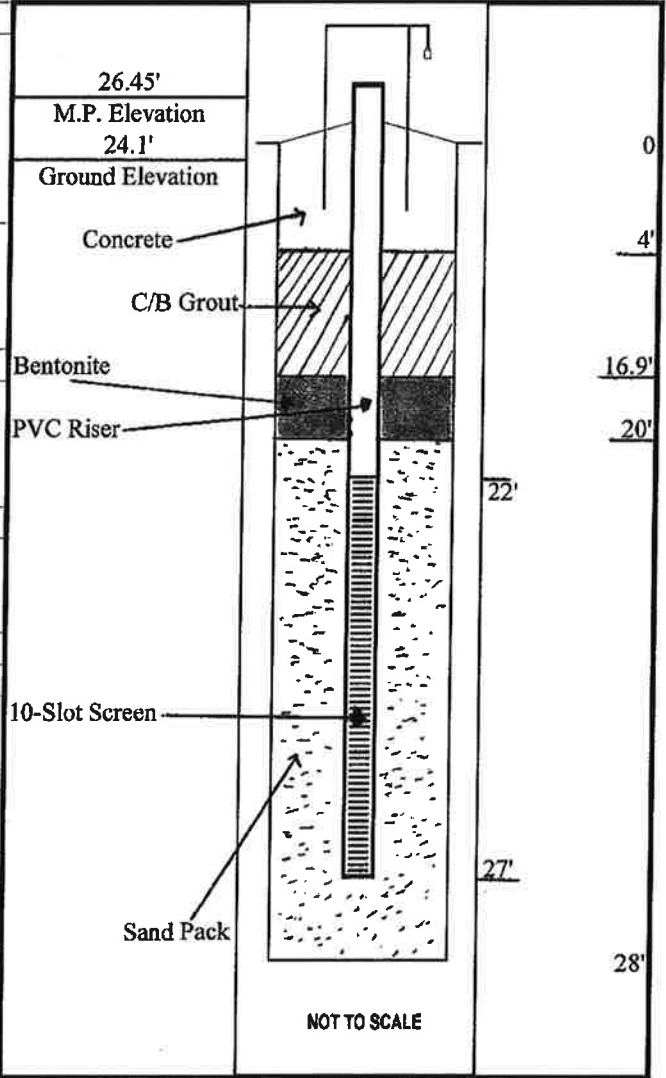
Sand: X Gravel: Natural:
 Grade: FillPro #0
 Amount: 140 Lbs Interval: 20' - 27' BGS

Seal(s)

Type: Concrete Interval: 0 - 4' BGS
 Type: Bentonite Interval: 16.9' - 20' BGS
 Type: Interval:

Locking Casing: Yes No

Well Installation Detail



Notes: Completed at 1:15 pm

2003
Test Pit Logs
Tetra Tech

Legend



Approximate Test Pit Locations



Former Canal

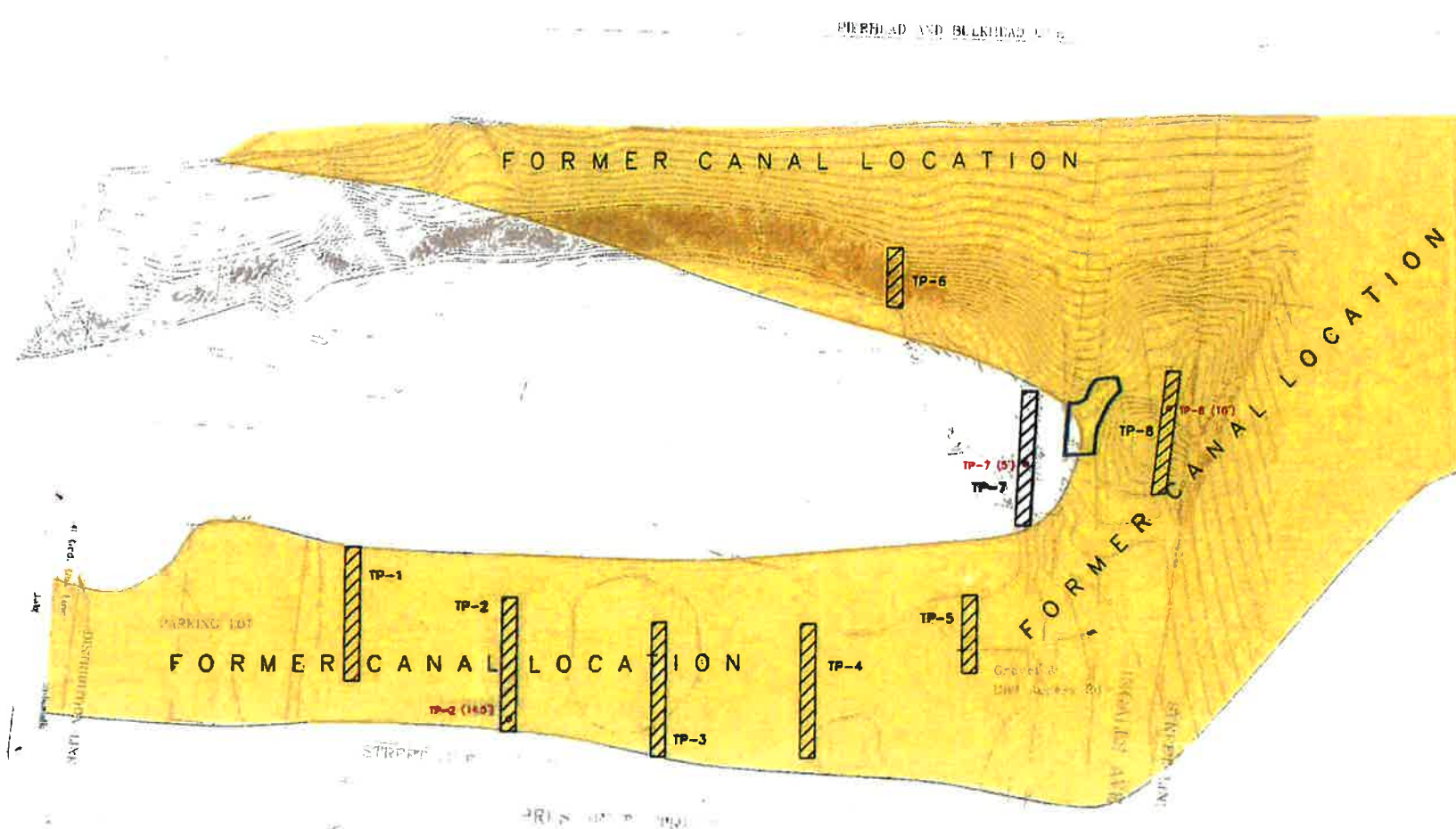
Source: NMPC DRAWING SHOWING THE PIERHEAD AND BULKHEAD LINE DATED 1921



Approximate Area of Ingalls Ave. Waste Removal (1999)



Approximate Soil Sample Location (depth shown in parentheses)



REFERENCE

- 1) NMPC DRAWING TITLED 'SMITH AVE - SHAKER RD #16 EXPOSED PIPELINE UNDER HUDSON RIVER' DRAWING NO D-31979-E. INDEX NO 210-A16-M49.
- 2) TAX MAPS NO 090-82 & 090-70 CITY OF TROY. COUNTY OF RENSSELAER.
- 3) NMPC DWG RO D-31979-E INDEX NO 210-A16-M49 TITLED 'SMITH AVE - SHAKER RD #16. EXPOSED PIPELINE UNDER THE HUDSON RIVER. DATED 8/30/1995

NOTE

- 1) VERTICAL DATUM ON THIS DRAWING IS NGV - 29
- 2) HORIZONTAL DATUM FOR THIS PROJECT IS NEW YORK STATE PLANE NAD 1983, EASTERN ZONE
- 3) PROPERTY INFORMATION IS BASED ON TAX MAPS SHOWN IN REF. NO. 3

	TEST PIT EAST END		TEST PIT WEST END	
	Northing	Eastng	Northng	Eastng
TP-1	1426570.722	711180.598	1426592.392	711096.692
TP-2	1426627.901	711229.521	1426640.511	711146.614
TP-3	1426702.197	711238.271	1426705.000	711196.787
TP-4	1426778.808	711238.106	1426779.919	711195.455
TP-5	1426855.916	711208.411	1426862.023	711167.521
TP-6	1426811.936	711033.566	1426827.973	710991.342
TP-7	1426883.200	711132.570	1426883.245	711075.083
TP-8	1426930.869	711116.050	1426940.536	711070.134

GIS/NM Troy/Ingalls Avenue/Test Pit Locations and Excavation Area 111003 no lines.DWG



TETRA TECH FW, INC.

TITLE:
**Test Pit Locations
 Site Investigation Report
 Ingalls Avenue Operable Unit, Troy, New York**

Niagara Mohawk
 A National Grid Company

DWN.: MK	DATE: 11/06/03	PROJECT NO.:
CHKD:	REV.: 0	FIGURE NO.:
DES.: LEN	APPD.:	1

Test Pit Data
Tetra Tech- 2003

Tetra Tech FW, Inc.
TEST PIT LOG

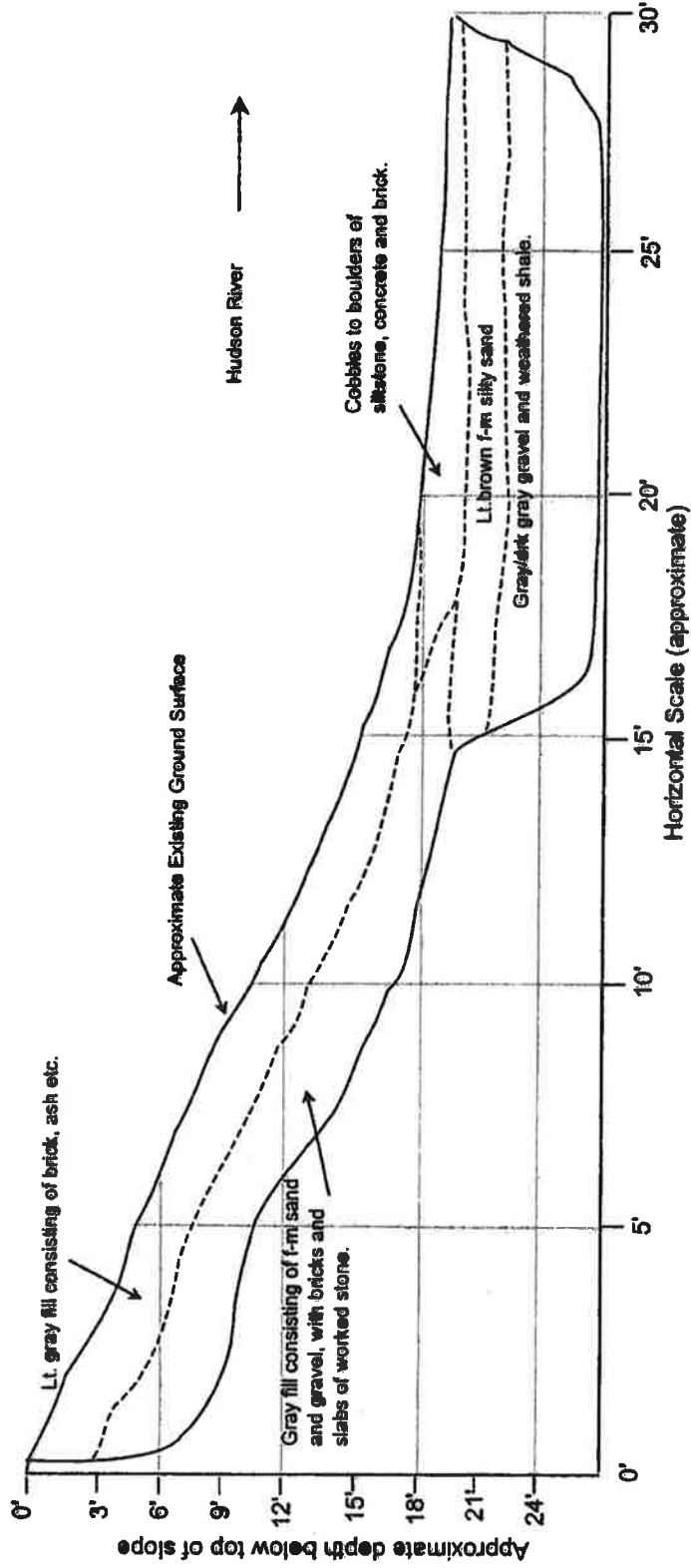
Project: Troy (Ingalls Ave)
 Test Pit No. TP-6
 Date: 9/25/2003
 Logged By: J. Imhoff
 Pit Orientation: East to West

Start Time: 12:00
 Final Length 30' (approximate)
 Final Depth 10' (maximum)
 Final Width 4-5 ft.

End Time: 12:40
 Weather: Overcast
 Surface Conditions: Steep, heavily vegetated embankment.

E

W



Notes: No visual or olfactory evidence of suspected residuals observed in test pit.
 This log is a combined representation of three overlapping-adjacent test pits that were excavated on the slope: one excavated at the top of the slope, one in the middle of the slope and the third at the toe of the slope.
 Excavation to west stopped as native deposits (sand, gravel, weathered shale) were encountered.

Water Influx: NA
 Seepage: NA
 Static: NA

Tetra Tech FW, Inc.
TEST PIT LOG

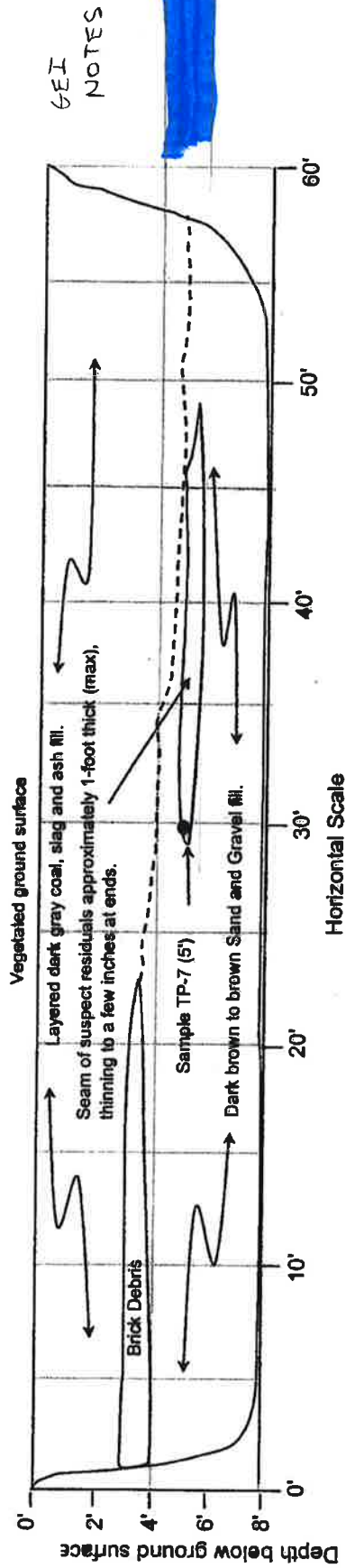
Project: Troy (Ingalls Ave)
 Test Pit No. TP-7
 Date: 9/25/2003
 Logged By: J. Imthoff
 Pit Orientation: West to East

Start Time: 13:30
 Final Length 60'
 Final Depth 8'
 Final Width 4-5 ft.

End Time: 15:10
 Weather: Overcast with light rain
 Surface Conditions: Vegetated hillside, south of roadway.

W

E



Notes: Suspect residuals consist of dark brown, densely matted wood chips with sulfurous odor. Sample TP-7 (5') collected at 14:00 from depth of 5 ft bgs at distance of 30 feet from the west end of the test pit.
 Depth of test pit limited due to its proximity to road (Ingalls Ave) and lack of space for stockpiling soils.

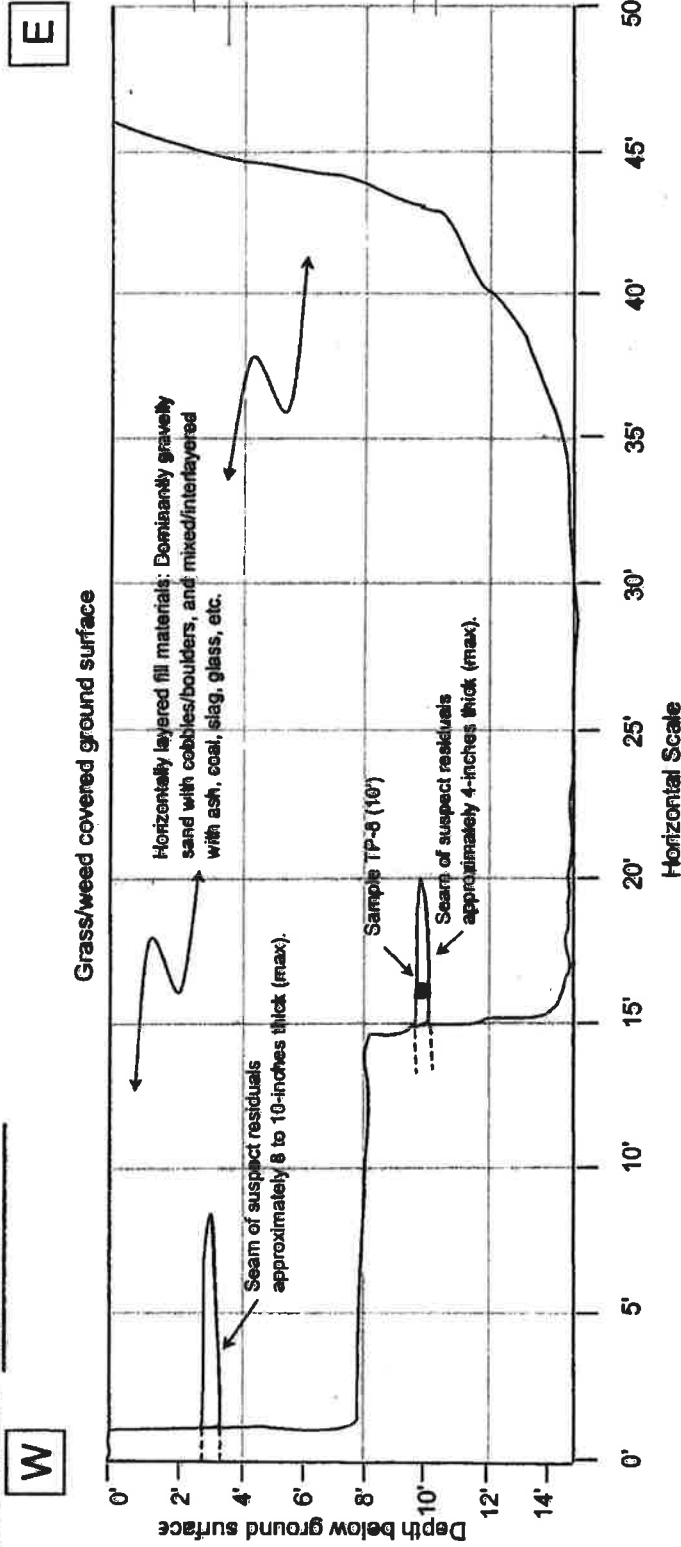
Water Influx: _____
 Seepage: NA
 Static: NA

Tetra Tech FW, Inc.
TEST PIT LOG

Project: Troy, (Ingalls Ave)
 Test Pit No. TP-8
 Date: 9/25/2003
 Logged By: J. Imhoff
 Pit Orientation: West to East

Start Time: 15:30
 Final Length 46'
 Final Depth 15 (max)
 Final Width 4-5 ft.

End Time: 16:45
 Weather: Rain, heavy at times
 Surface Conditions: Grass and weeds



Notes: Suspect residuals consist of dark brown, densely matted wood chips with strong, sulfurous odor. Sample TP-8 (10') collected at 16:00 from depth of 10 ft bgs at distance of 16 feet from the west end of the test pit.
 Length defined by limits of limited removal conducted in 1999 and by the location of suspect residuals observed in test pit TP-7.

Water Influx: NA
 Seepage: NA
 Static: NA



TETRA TECH EC, INC.

TEST PIT LOG

Project: Iroy (Ingalls Ave.)

Start Time: 0700 End Time: 1500 Weather: Overcast, cool, breezy

Test Pit No.: TP-9

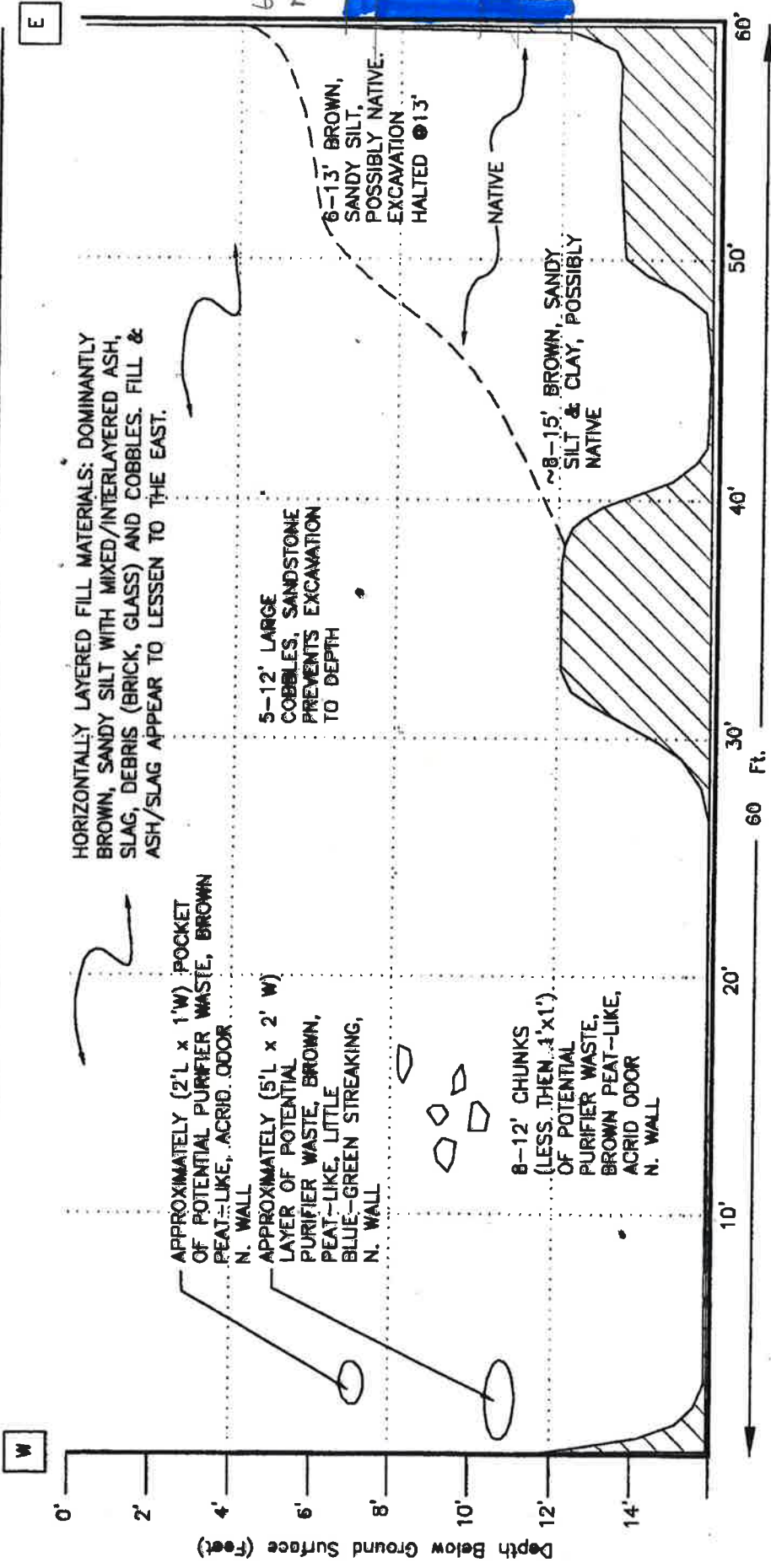
Final Length: 60 Ft. Final Depth: 15 Ft. Surface Conditions: Grass & weeds

Date: 11/29/2006

Final Width: 8 Ft. (Approx)

Logged By: C. Joblon

Pit Orientation: West to East



Notes: POTENTIAL RESIDUAL MATERIAL CONSISTED OF DARK BROWN PEAT/SAWDUST MATERIAL WITH AN ACRID ODOR

Water Influx: _____

Seepage at: NA Ft.

Static at: NA Ft.

6 E I
NOTES

2001
Soil Borings
Foster Wheeler



<p>SOURCE: NY STATE GIS DATA CLEARINGHOUSE 2007 NATURAL COLOR ORTHOIMAGERY</p> <p>NOTES: - DEPTH IS IN FEET BELOW GROUND SURFACE - ALL CONCENTRATIONS ARE IN mg/kg - NA = NOT ANALYZED - ND = NOT DETECTED - WHERE NO DEPTH IS INDICATED, SAMPLES ARE OF SURFICIAL MATERIAL - WASTE MATERIAL WAS PRESENT AS DISCRETE LAYERS IN TP-2, TP-7 AND TP-8 - WASTE MATERIAL IN TP-9 WAS PRESENT AS SMALL PIECES, AND POCKETS NO MORE THAN 5 ft x 2 ft IN SIZE</p>		<p>Legend</p> <ul style="list-style-type: none"> Monitoring Well Sample and Boring Locations Test Pit (waste observed) Test Pit (no waste observed) Approximate Area of 1999 Waste Removal 	<p>TETRA TECH EC, INC.</p> <p>FIGURE 3</p> <p>INVESTIGATION SUMMARY TROY (SMITH AVE) INGALLS AVENUE (OU-2)</p> <p>TROY, NY</p>
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Bore Log Data
Foster Wheeler - 2001

1-1/SB1A

LOG OF BORING FWSB-11

(Page 1 of 1)

PROJECT: NM-Troy(Smith Ave.)
PROJECT NO.: 1824.0000.0001.00004
LOCATION: Troy, NY

DATE STARTED: : 0/28/01
DATE COMPLETED: : 0/28/01
GEOLOGIST: : C. Prothro
DRILLER: : Lynn Drilling
DRILLING METHOD: : Hollow Stem Auger

GW DEPTH: : -4.0ft bgs
ELEVATION: :

Depth in feet	RECOVERY	USCS	GRAPHIC	DESCRIPTION	TIME	DATE	PTD (ppm)	Sample I.D.	COMMENTS
0	14"	SW	[Pattern]	Grayish-brown to brownish yellow f-m SAND with subangular to rounded f-c Gravel, trace to some silt and c sand, loose, moist.	0:00	0/28/01	0.0	SB1A(0-2)	
1								(0-20-01)	
2	16"	SW	[Pattern]	Grayish-brown to brownish yellow f-m SAND with subangular to rounded f-c Gravel, trace to some silt and c sand, loose, moist.	0:00		0.0	SB1A(2-4)	
3								(0-20-01)	
4	4"	SW	[Pattern]	Grayish-brown to brownish yellow f-m SAND with subangular to rounded f-c Gravel, trace to some silt and c sand, loose, moist.	0:21		0.0		
5	6"	SP	[Pattern]	Greenish black f SAND. 3-8" from top of sample greenish-black clay, loose wet.	0:28		0.0		
6									
7	20.5'	SP	[Pattern]	Greenish-black interbedded f SAND and organic Clay 2-3" thick.	0:30		0.0		
8									
9	17.5'	SP	[Pattern]	Bottom 4" c SAND and subrounded f Gravel. Organic material present above lower clay layer, loose, wet.	0:40		0.0		
10									
11	12"	CL/SW	[Pattern]	Top 2.5" Greenish gray to greenish-black c SAND and subrounded f Gravel. Organic material present above lower clay layer, loose, wet.	0:46				
12									
13	13"	SP/GW	[Pattern]	Bottom 10" f-c SAND and angular to rounded f-c Gravel, trace silt, loose, wet.	10:04		0.0		
14									
15	2"	SW	[Pattern]	Top 3" gray organic CLAY.	10:20				
16									
17	6"	SW	[Pattern]	Bottom 10" f-c SAND and subangular to subrounded f-c Gravel, loose, wet.	10:47				
18									
19	3"	SW/GW	[Pattern]	Dark bluish-gray c SAND and f-c Gravel, medium density, wet.	12:26				
20									
21	4"	SW	[Pattern]	Limestone cobble fragments	12:50		0.0		
22									
23	6"	SW	[Pattern]	Grayish-blue till.	13:50		0.0		
24									
25	13"	SW	[Pattern]	Bluish-gray unweathered till, f-c SAND with angular to subrounded f-c Gravel, dense, dry to moist.	19:20		0.0		
26									
				Dark-bluish gray till unweathered. Auger refusal at 20'.	14:35		0.0		
				Dark-bluish gray till unweathered. Auger refusal at 20.5'.					
				Dark-bluish gray till unweathered. Auger refusal at 22.5'.					

P:\Troyborings logs 0-18-01\FWSB-11.BOR

Notes: Soil samples collected on 0-20-01 from a boring completed 1 ft away from FWSB-11.

Analytical parameters: TCL VOCs, TCL BHAs, TAL Metals plus Cyanide.



1-218K-1

LOG OF BORING FW5B-12

(Page 1 of 1)

PROJECT: NM-Troy (Smith Ave.)
 PROJECT NO.: 1824.0000.0001.00004
 LOCATION: Troy, NY

DATE STARTED: : 8/28/01
 DATE COMPLETED: : 8/28/01
 GEOLOGIST: : C. Prothro
 DRILLER: : Lynn Drilling
 DRILLING METHOD: : Hollow Stem Auger

GW DEPTH: : Not Encountered
 ELEVATION: :

Depth in feet	RECOVERY	USCS	GRAPHIC	DESCRIPTION	TIME	DATE	PID (ppm)	Sample I.D.	COMMENTS
0	16"			Dark brown to olive-brown f SAND and Silt, with some subrounded m-c gravel, loose, dry.	18:03	8/28/01	0.0	BK1(0-2)	
1									
2	16"			Dark brown to olive-brown f SAND and Silt, with some subrounded m-c gravel, loose, dry.	18:15	8/28/01	0.0		
3									
4	0.0"			No Recovery.	18:28	8/28/01			
5									
6	8"			Dark brown to olive-brown f SAND and Silt, with some subrounded m-c gravel, loose, dry.	18:38	8/28/01	0.0		Slight MGP like odor
7									
8									
9	13.5"			Dark brown to olive-brown f SAND and Silt, with some subrounded m-c gravel, loose, dry.	18:50	8/28/01	0.0		
10									

F:\1107\Boring logs 8-16-01\FW5B-12.BOR

Notes: BK1(0-2) Collected 8-28-01, Analyzed for BTEX, PAH, and Cyanide.



NO SAMPLE
1-3

LOG OF BORING FWSB-13

(Page 1 of 1)

PROJECT: NM-Troy(Smith Ave.)
PROJECT NO.: 1824.0000.0001.0004
LOCATION: Troy, NY

DATE STARTED: : 8/31/01
DATE COMPLETED: : 8/31/01
GEOLOGIST: : C. Prothro
DRILLER: : Lynn Drilling
DRILLING METHOD: : Hollow Stem Auger

GW DEPTH: : Not Encountered
ELEVATION: :

Depth in ft	RECOVERY	USCS	GRAPHIC	DESCRIPTION	TIME	DATE	PID (ppm)	Sample I.D.	COMMENTS
0	7"			Yellow-brown f SAND and Silt with subrounded to angular f-c gravel. loose, dry.	18:14	8/31/01	0.0		
1		SP/ML							
2	7"			Top 2" Yellow-brown f SAND and Silt with subrounded to angular f-c gravel. Bottom 5" olive-brown to olive m SAND, trace to some subrounded to rounded Gravel, loose, moist.	18:23	8/31/01	0.0		
3		SP							
4	7"			Pale yellowish-gray f SAND and Silt with subangular to subrounded f-m gravel, loose, moist.	18:28	8/31/01	0.0		
5		SP/ML							
6	8.5"			Top 4" Pale yellowish-gray f SAND and Silt with subangular to subrounded f-m gravel. Bottom 4.5" olive-brown to olive m SAND, trace to some subrounded to rounded f Gravel, loose, moist.	18:35	8/31/01	0.0		
7									

P:\Troy\Boring Logs & 18-01\FWSB-13.BOR

Notes:

FOSTER W WHEELER

1-4 NO SAMPLE

LOG OF BORING FWSS-14

(Page 1 of 1)

PROJECT: NM-Troy(Smith Ave.)
 PROJECT NO.: 1824.0000.0001.00004
 LOCATION: Troy, NY

DATE STARTED: : 8/31/01
 DATE COMPLETED: : 8/31/01
 GEOLOGIST: : C. Prothro
 DRILLER: : Lynn Drilling
 DRILLING METHOD: : Hollow Stem Auger

GW DEPTH: : Not Encountered
 ELEVATION: :

Depth in feet	RECOVERY	USCS	GRAPHIC	DESCRIPTION	TIME	DATE	PIB (ppm)	Sample I.D.	COMMENTS
0	1'			Gray to orange white f SAND, Silt and ash with subangular c gravel, loose, dry.	11:45	8/31/01	0.0		
1		SPML							
2	2'			Black to greenish blue f SAND and Silt, with urban fill (cinder, ash, etc.), loose, dry.	11:55	8/31/01	0.0		
3		SPML							
4	3.25'			Top 1.5" Black to greenish blue f SAND and Silt, with urban fill (cinder, ash, etc.), loose, dry. Middle 3" black char coal, remainder urban fill, loose, dry.	12:05	8/31/01	0.0		
5		SPML							
6	4'			Urban fill (cinder, ash, brick fragments)	12:25	8/31/01			
7									
8	7.5'			Urban fill (cinder, ash, brick fragments)	12:25	8/31/01	0.0		
9									
10									

SEE NOTE



P:\Trayborings Logs 8-31-01\FWSS-14.BOR

Notes:



NO SAMPLE
1-5

LOG OF BORING FWSB-15

(Page 1 of 1)

PROJECT: NM-Troy(Smith Ave.)
PROJECT NO.: 1824.0000.0001.00004
LOCATION: Troy, NY

DATE STARTED: : 8/31/01
DATE COMPLETED: : 8/31/01
GEOLOGIST: : C. Prestro
DRILLER: : Lynn Drilling
DRILLING METHOD: : Hollow Stem Auger

GW DEPTH: : Not Encountered
ELEVATION: :

Depth in feet	RECOVERY	USCS	GRAPHIC	DESCRIPTION	TIME	DATE	PID (ppm)	Sample I.D.	COMMENTS
0									
15"		SP/AL		Top 6.5" Very pale brown to light yellowish brown f SAND with Silt and subrounded to subangular f-c gravel. Middle 2.5" dark greenish gray cinders. Bottom 6" yellowish red brick, loose, dry.	12:55	8/31/01	0.0		
15"		SP		Top 10" red brown f SAND and brick fragments. Bottom 5" gray cinder, loose, dry.	13:10	8/31/01	0.0		
7.5"				Gray cinder, trace to some wood, loose dry.	13:18	8/31/01	0.0		
8.5"		SP/GW		Top 3" black to dark gray cinder and sh. Bottom 5.5" olive brown to white f SAND and subrounded to subangular f-c Gravel, loose dry.	13:21	8/31/01	0.0		
6.0"				No Recovery.	13:30	8/31/01	0.0		

P-11:re boring logs 8-16-01 FWSB-15 BDR

Notes:

1-61586A (0-2) (8-10)

LOG OF BORING FW5B-18

(Page 1 of 1)

PROJECT: NM-Troy(Smith Ave.)
PROJECT NO.: 1824.0000.0001.00004
LOCATION: Troy, NY

DATE STARTED: : 8/31/01
DATE COMPLETED: : 8/31/01
GEOLOGIST: : C. Pruthi
DRILLER: : Lynn Drilling
DRILLING METHOD: : Hollow Stem Auger

GW DEPTH: : Not Encountered
ELEVATION: :

Depth ft	RECOVERY	USCS	GRAPHIC	DESCRIPTION	TIME	DATE	PID (SPM)	Sample I.D.	COMMENTS
0 1 2	16"	SP		Dark gray Ash and cinder with 2.5" gray-brown f SAND from 8-10.6", loose, dry.	14:08	8/31/01	0.0	SB6A(0-5)" (8-20-01)	Sample collected from boring 1ft away on 8-20-01
3	8.6"			Top 4" dark gray ash cinder and urban fill. Bottom 5.6" dark brown purifier waste like material.	14:41	8/31/01	18.0		Strong purifier waste like odor (material not present in boring 1 ft away)
4 5	12"	SP/GP		Top 1.6" dark brown purifier waste like material. Middle 2.0" gray ash and cinders. Bottom 8" olive-brown f SAND with angular to subrounded m Gravel.	16:00	8/31/01	0.0		
6 7	16.5"	SP/GP		Reddish-brown m-c SAND with subrounded to subangular Gravel, loose to dry.	16:55	8/31/01	0.0	SB6A(8-10)" (8-20-01)	Sample collected from boring 1ft away on 8-20-01
8 9 10	0.0			No Recovery.	16:08	8/31/01		SB6A(8-10)DUP (8-20-01)	

GEI NOTES



Notes: Soil samples collected on 8-20-01 from a boring completed 1ft away from FW5B-18. Soil Boring was re-drilled 1 foot away on 8-20-01 due to sample loss. Purifier material was not encountered in the 2nd boring.
* Analytical parameters: BTEX, PAH, and Cyanide.
- Analytical parameters: TCL VOCs, TCL DNAs, TAL Metals plus Cyanide.



10-22-2001 P:\Troy\Boring logs 8-18-01\Fw5b-18.log

(0-2) (10-12) (19-22)

MW19A

PROJECT: NM-Troy (Smith Ave.)
 PROJECT NO.: 1924-0008-0001-00004
 LOCATION: Troy, NY

DATE STARTED: 8/20/01
 DATE COMPLETED: 8/20/01
 GEOLOGIST: C. Prud'homme
 DRILLER: Lynn Drilling
 DRILLING METHOD: Huber Steam Auger

WELL DEPTH: 12.00 lbs
 ELEVATION:

LOG OF BORING MW-19

(Page 1 of 2)



DEPTH IN FEET	RECOVERY	GRAPHIC	DESCRIPTION	TIME	DATE	PID (ppm)	SAMPLE I.D.	COMMENTS
0	0.0'			8:32	8/20/01	0.0	19-19-01-27	
1	0.5'	ML/SP	Gray SILT and f Sand, with f-c gravel (angular to rounded), trace urban fill (bricks), loose, dry.	8:36		0.0	19-20-01	
2	1.0'	ML/SP	Gray SILT and f Sand, with f-c gravel (angular to rounded), trace urban fill (bricks), loose, dry.	8:38		0.0		
3	1.5'	ML/SP	Gray SILT and f Sand, with f-c gravel (angular to rounded), trace urban fill (bricks), loose, dry.	8:40		0.0	19-19-01-12	Black staining Organic like odors
4	2.0'	ML/SP	Gray SILT and f Sand, with f-c gravel (angular to rounded), trace urban fill (bricks), loose, dry.	8:43		0.0	19-20-01	Purple staining Organic like odors
5	2.5'	SP	Top 3" Gray SHALE fragments. Olive-gray f SAND, trace to some angular to subrounded in Gravel. Bottom 2" olive brown fine SAND, loose, moist.					
6	3.0'	SP/ML	Olive-brown to greenish-gray f SAND, trace to some silt, loose, moist.					
7	3.5'	SP	Top 5" Olive-brown to greenish-gray f SAND, trace to some Sil. Bottom 5" wood, moist.					
8	4.0'	SP	Top 5.5" dark greenish-gray f SAND. Bottom 10" wood, loose wet.					

WELL CONSTRUCTION

SURFACE SEAL :
 RISER ELEVATION :
 I.D. OF SURFACE CASING :
 TYPE OF SURFACE CASING :
 RISER PIPE I.D. :
 TYPE OF RISER :
 BOREHOLE DIAMETER :
 TYPE OF BACKFILL :
 SEAL :
 TYPE OF SEAL :
 SCREEN :
 TYPE OF SCREEN :
 SLOT SIZE X LENGTH :
 FINE SAND PACK :
 SAND PACK :
 BACKFILL BELOW WELL :

Well: MW-19
 Elev.:

NOTES

Soil samples collected on 8-20-01 from a well being 18' away from MW-19.

* Analytical Parameters: TEL VOCs, TCL BTEX, TAL Metals plus cyanide

** Analytical Parameters: BTEX, PAH, Cyanide.

PROJECT: MW-Troy(Smith Ave.)
 PROJECT NO.: 1624.0000.0001.00004
 LOCATION: Troy, NY

DATE STARTED: 03/04/01
 DATE COMPLETED: 07/20/01
 GEOLOGIST: C. Prueber
 DRILLER: Lynn Drilling
 DRILLING METHOD: Miller Steam Auger

GW DEPTH: 12.00 bgs
 ELEVATION: :

LOG OF BORING MW-19
 (Page 2 of 2)

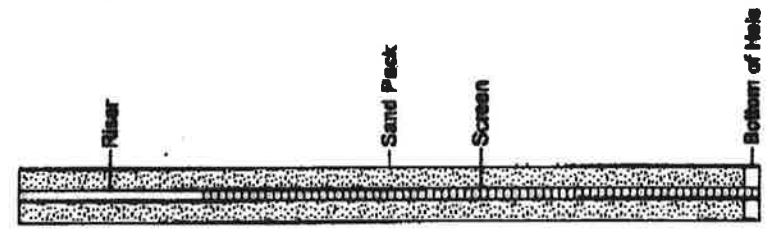
Notes: Refused at 27.00 bgs.

FOSTER WHEELER

Well: MW-19
 Elev: :

Well Construction Information

Depth in Feet	RECOVERY	LOG GRAPHIC	DESCRIPTION	TIME	DATE	FW (gpm)	Sample I.D.	COMMENT
14	0.0'		No Recovery.	10:00		0.0		
15								
16	12'	CLGP	Top 8" Greenish-gray organic CLAY, trace Post (wood fibers) Bottom 4" black angular f-c shale GRAVEL, trace in subrounded sandstone Gravel, loose, wet.	10:10		0.0	166-15(18-23)	
17								
18	10'	GW	Top 3" black angular f-c shale GRAVEL, trace in subrounded sandstone Gravel, loose, wet. Middle 3.5" dark greenish-gray m-c SAND.	10:20		0.0		
19								
20	10'	SW	Bottom 0.5" f-c SAND with f-c angular to sub rounded Gravel, loose, wet. Top 6" f-c SAND. Middle 4" f SAND with trace organic material.	10:20		0.0		
21								
22	10'	SPPT	Bottom 6" c SAND and angular to subrounded f-c Gravel, loose, wet. Top 12" Dark greenish-gray f SAND, trace subrounded f Gravel. Middle 2.5" very dark brown Post, trace black organic Clay. Bottom 1.5" dark bluish-gray m-c shale GRAVEL, loose, wet.	11:31		0.0		
23								
24	0.0'		No Recovery.	12:08		0.0		
25								
26	0.0'		No Recovery.	12:02		0.0		
27								
28								

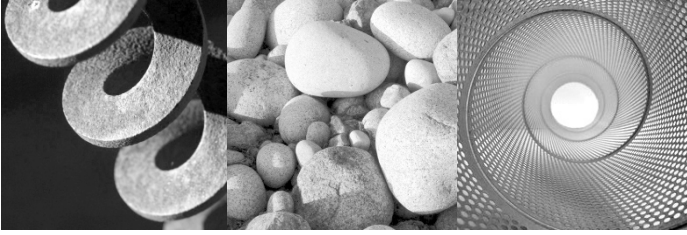


WELL CONSTRUCTION
 SURFACE SEAL :
 RISER ELEVATION :
 I.D. OF SURFACE CASING :
 TYPE OF SURFACE CASING :
 RISER PIPE I.D. :
 TYPE OF RISER : Sch. 40 PVC
 BOREHOLE DIAMETER :
 TYPE OF BACKFILL :
 SEAL :
 TYPE OF SEAL : Bentonite
 SCREEN :
 TYPE OF SCREEN: Sch. 40 PVC
 SLOT SIZE X LENGTH :
 FINE SAND PACK : #60 Sand
 SAND PACK : #60 Sand
 BACKFILL BELOW WELL :

NOTES
 Soil samples collected on 9-20-01 from a well boring 18 away from mw-19.
 * Analytical Parameters: TCL, VOCs, TCL DMAs, TAL Metals plus cyanide
 ** Analytical Parameters: BTEX, PAH, Cyanide.

Appendix B

Community Air Monitoring Plan



Consulting
Engineers and
Scientists

Community Air Monitoring Plan

Operable Unit 2 – Ingalls Avenue Area
Troy (Smith Avenue) Former MGP Site –

Troy, New York

NYSDEC Site # 442030

Index #: A4-0473-0000

Submitted to:

National Grid
300 Erie Boulevard West
Syracuse, NY 13202

Submitted by:

GEI Consultants, Inc., P.C.
1301 Trumansburg Road, Suite N
Ithaca, NY 14850

December 21, 2017

Project #116830-1405

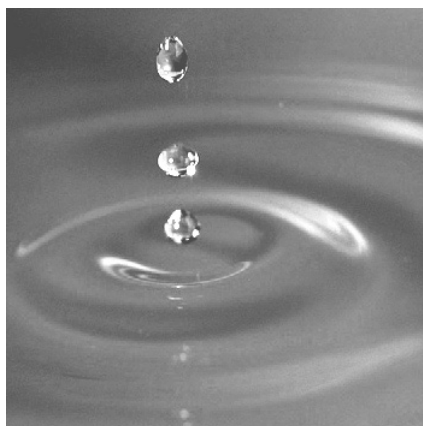


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Attachments

- A. Community Air Monitoring Daily Data Sheet
- B. NYSDOH Generic CAMP

Abbreviations and Acronyms

CAMP	Community Air Monitoring Plan
COC	Constituents of Concern
GEI	GEI Consultants, Inc., P.C.
HASP	Health and Safety Plan
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photoionization Detector
ppm	Parts per Million
SVOC	Semi-Volatile Organic Compounds
VOC	Volatile Organic Compounds
$\mu\text{g}/\text{m}^3$	Micrograms per cubic meter

1. Introduction

This document presents the Community Air Monitoring Plan (CAMP) that will be implemented during the Remedial Action (RA) for Operable Unit 2 (OU2) Ingalls Avenue Area of the Troy (Smith Avenue) Former MGP site, located in City of Troy, New York.

A CAMP is required by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) at sites where ground-intrusive activities may result in airborne release of constituents of concern (COC). Towards that end, community air monitoring will be performed for total volatile organic compound vapors (VOCs), and for particulates (dust). The NYSDOH generic CAMP is included as Attachment B.

The site is located on Ingalls Avenue, adjacent to the Hudson River. The site location is shown on figures in the attached Remedial Action Work Plan (RAWP). OU2 consists of an upland area comprising portions of two properties owned by the City of Troy. OU2 consists mostly of a former canal that was filled in the early 20th century and is located south of the Troy (Smith Avenue) MGP site. The geographic boundaries of each operable unit are shown on figures provided in the RAWP.

This CAMP specifically applies to the RA work in OU2. The RA field work will be performed according to the methods provided in the attached document entitled “*Remedial Action Work Plan, Troy (Smith Avenue) OU2 Former MGP Site – Ingalls Avenue Area, Troy, New York,*” dated December 2017. The remedial field work involves the excavation and removal of purifier residual impacted soil. Community air monitoring will be performed during the excavation of soil, and the backfilling and grading activities.

The objectives of this CAMP are to:

- Ensure that the airborne concentrations of COC are minimized to protect the community;
- Provide an early warning system so that potential emissions can be controlled on site at the source; and
- Measure and document the concentrations of airborne COC to confirm compliance with the specified limits.

This CAMP is a companion document to GEI’s site-specific Health and Safety Plan (HASP). The HASP is a separate document and is directed primarily toward protection of on-site workers within the designated work zones.

2. Air Monitoring Equipment, Methods, and Action Levels

This section provides instructions for conducting the CAMP. Discussed are the COC to be monitored, the equipment to be used, where sampling is to be performed, and the action limits. For the OU2 Troy Ingalls Area, community air monitoring will be performed for total VOCs and particulates (dust) during the excavation of soil, and backfilling and grading operations.

In addition to the community air monitoring, work/exclusion zone monitoring will be performed during work activities where impacted soil may be encountered. The exclusion zone air monitoring requirements, equipment, and action levels are described in the site-specific HASP for this project. Note, however, that the work zone air monitoring and the community air monitoring are conducted as part of the overall site control program. When work zone VOC or particulate readings are found to exceed the downwind CAMP limits, the field staff will check the upwind and downwind air monitoring instruments to assess whether control measures will be required.

2.1 Monitoring Locations

Two community air monitoring locations will be established at the start of each workday – one upwind of the excavation work area, and one downwind of the excavation work area/exclusion zone. Fixed stations for CAMP monitoring will not be employed for this project due to the anticipated short duration of the project, and the need to monitor around four separate excavation areas at the site. The purpose of the upwind station will be to determine the background concentration of VOCs and particulates at the worksite. The downwind monitoring station will be used to assess compliance with the NYSDEC / NYSDOH specified action limits for VOCs and particulates. The upwind VOC and dust measurements will be subtracted from the downwind measurements in order to compare the downwind instrument readings to the CAMP action levels.

The location of each monitoring station will be noted on the *Community Air Monitoring Daily Data Sheet* (Daily Data Sheet) [Attachment A]. The locations of the instruments may be changed during the day to adapt to changing wind directions. Each location will be noted on the Data Sheet, along with the start and stop time at each location. Field personnel will be prepared to move the equipment to multiple locations in the event that there is little wind, if the wind direction changes frequently, or if there is a change to the location of the most sensitive downwind receptor location.

If necessary, precautions to minimize the release of VOCs and particulates will be taken at the work zone, and engineering or work controls used to protect the downwind receptor. These controls for minimizing releases from the work zone are discussed in Section 3.

2.2 Air Monitoring Equipment

The monitoring instruments will be calibrated at the start of each workday, and again during the day if the performance of an instrument is in question. The time and method of calibration will be noted on the Daily Data Sheet. Both the photoionization detectors (PIDs) and particulate meters will be mounted on a tripod in a vented protective case, and programmed to record 15-minute averages. A monitoring technician will check the instrumentation at each of these locations regularly during the work-day to ensure that they are operating properly.

2.2.1 VOC Monitoring Equipment

VOC monitoring will be performed using PIDs (RAE Systems MiniRAE™ or equivalent) equipped with a 10.2 or 10.6 eV bulb. The instruments will be set to record 15-minute running average concentrations. The PIDs will be equipped with an audible alarm to indicate an exceedance of the action level of 5 ppm total VOCs.

2.2.2 Particulate (Dust) Monitoring Equipment

Particulate monitoring will be performed using meters set to measure 10 micron and finer particulates (PM-10). Particulates will be monitored using an MIE DataRAM DR-2000I, TSI DustTrak™, or equivalent, which is capable of measuring PM-10. The equipment used will be set to record 15-minute running average concentrations, for comparison to the action levels.

In addition to the instrument readings, fugitive dust migration will be visually assessed during all work activities, and the observations recorded. Per NYSDEC requirements, visible dust migration will not be allowed. If visible dust is observed to be migrating from the work zone, the work will be stopped and dust control measures implemented.

2.3 Monitoring Action Levels and Responses

The action levels and responses for VOCs and particulates are presented in Table 1.

Table 1. Air Monitoring Response Levels and Actions

<i>VOCs</i>	
Response Level	Actions
>1 ppm at the wall of an occupied structure or at an air intake	<ul style="list-style-type: none"> ▪ Check the indoor air concentration and compare with background measurements taken previously
>5 ppm above background for 15-minute average	<ul style="list-style-type: none"> ▪ Temporarily halt work activities ▪ Continue monitoring, especially inside of occupied structures ▪ If VOC levels decrease (per instantaneous readings) below 5 ppm over background, work activities can resume
Persistent levels >5 ppm over background but <25 ppm	<ul style="list-style-type: none"> ▪ Halt work activities ▪ Identify source of vapors ▪ Corrective action to abate emissions ▪ Continue monitoring ▪ Resume work activities if VOC levels 200 feet downwind of the property boundary or half the distance to the nearest potential receptor is <5 ppm for a 15-minute average
>25 ppm at the perimeter of the work area	<ul style="list-style-type: none"> ▪ Shut down work
<i>Particulates</i>	
Response Level	Actions
>100 µg/m ³ above background for 15-minute average or visual dust observed leaving the site	<ul style="list-style-type: none"> ▪ Apply dust suppression ▪ Continue monitoring ▪ Continue work if downwind PM-10 particulate levels are <150 µg/m³ above upwind levels and no visual dust leaving site
>150 µg/m ³ above background for 15-minute average	<ul style="list-style-type: none"> ▪ Stop work ▪ Re-evaluate activities ▪ Continue monitoring ▪ Continue work if downwind PM-10 particulate levels are <150 µg/m³ above upwind levels and no visual dust leaving site

Sources:

- NYSDOH Community Air Monitoring Plan, December 2009, as published in NYSDEC DER-10, Appendix 1A, 2010.
- Fugitive Dust and Particulate Monitoring, NYSDEC DER-10, Appendix 1B, 2010.
- Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures, NYSDOH.

All data will be downloaded to a computer on a daily basis and saved for review. The data will be provided to the NYSDEC and/or the NYSDOH upon request at any stage of the project.

If VOC or particulate action levels are observed to be exceeded during the work day, the event, the source and corrective actions taken will be recorded on the Daily Data Sheet and reported to the on-site NYSDEC representative. If an on-site representative is not present, exceedances will be noted in the daily report to the NYSDEC project manager within one business day.

Table 2. Emergency Contacts and Telephone Numbers

Fire, Police, Ambulance		911
NYSDEC Contact	John Spellman – Project Manager	(518) 402-9686 (office) (518) 391-4565 (cell)
GEI Contacts	PJ Snyder – Project Manager Aaron Gorges – GEI Construction Manager	(781) 424-9929 (cell) (607) 592-9221 (cell)
National Grid Contact	Steve Beam – Project Manager	(315) 428-5690 (office) (315) 663-5304 (cell)

2.4 Odor Monitoring

The field investigation personnel will record observations of odors generated during the implementation of the field activities. When odors attributable to the exposing of impacted media are generated in the work area during intrusive activities observations will also be made at the downwind limit of the site. The observations will be made to assess the potential for significant odors reaching on-site receptors or being transmitted off site. The downwind odor monitoring will be performed in conjunction with the PID and dust monitoring program described in this CAMP.

Upon detection of odors at the site perimeter, site controls, starting in the work area, will be implemented. The site controls described in Section 3 will be used to assist with odor mitigation. Note that the goal of the Odor Mitigation Plan is to minimize and to prevent, where practicable, the off-site migration of odors. Due to the short distances between any work area at the site and the on-site receptors property line, site controls will be implemented proactively when odors are detected in the breathing zone at any work area.

There are no action levels specified for odors. In the event that odors persist at the downwind receptors or property line after control measures are carried-out, the odor conditions will be discussed with the National Grid and NYSDEC project managers.

3. Control Procedures

This section outlines the procedures to be used to control VOCs, odors, and particulates that may be generated during the excavation field activities. The remedial program will be conducted using one principal excavation technique that may generate odors: subsurface soil excavation. The remainder of this section is intended to provide site managers, representatives of NYSDEC and NYSDOH, and the public with information summarizing typical odor control options, and to provide some guidance for their implementation. A description of potential sources of odors and methods to be used for odor control are presented in the following sections.

3.1 Potential Sources of Odors and VOCs

Generally, the residuals encountered at former MGP sites are well defined. They are related to residual coal tar-like materials and petroleum, and principally contain VOCs, polycyclic aromatic hydrocarbons (PAHs), and a number of inorganic constituents, including metal-complexed cyanide compounds, and metals. Constituents of MGP tar or petroleum products can produce odor emissions during investigation activities when they are unearthed during excavation. When this occurs, VOCs and light-end semi-volatile organic compounds (SVOCs) can volatilize into the ambient air. Some MGP residuals can cause distinctive odors that are similar to mothballs, roofing tar, or asphalt driveway sealer. It is important to note that the CAMP will provide for continual monitoring of VOCs and particulates during the field work to monitor for any potential release of constituents which may exceed the exposure limits for downwind receptors. It is important to note that MGP tar-impacted soil has not been identified at the Ingalls OU2 Area during the multiple phases of site investigation. Only purifier residuals have been previously identified at OU2.

3.2 General Site Controls

Several excavation procedure site controls that will be implemented include:

- Every effort will be made to minimize the amount of time that impacted material is exposed to ambient air at the site.
- Soil will be containerized in roll-off boxes as soon as possible during completion of each excavation.
- Meteorological conditions are also a factor in the generation and migration of odors. Some site activities may be limited to times when specific meteorological conditions prevail, such as when winds are blowing away from a specific receptor.

3.3 Secondary Site Controls

If substantial VOCs or odors still present an issue following implementation of the above procedures, secondary controls will be enacted. The site manager will work through the applicable list of secondary controls until the perimeter odor issues are resolved. The site manager will work closely with National Grid and the NYSDEC during this task. Final selection of controls will be dependent on field conditions encountered.

Stockpiling of soil is not anticipated during this RA as soil will be placed in roll-off boxes. However, if it is needed in future tasks, secondary controls include the following:

- For stockpiled impacted soil, temporary tarps or polyethylene covers will be used to control odors, VOCs, and dust.
- Water may be sprayed onto dry soils to minimize the generation of dust.
- The placement of portable barriers close to small active source areas (excavations) can elevate the discharge point of emissions to facilitate dispersion and minimize the effect on downwind receptors. The barriers can be constructed using materials such as plastic “Jersey barriers”, or fence poles and visual barrier fabric/plastic. The barriers are placed as temporary two or three-sided structures around active test pit or other intrusive investigation areas, oriented such that the barriers are placed on the upwind and downwind sides of the source. If only one side of the source can be accessed, then the barrier should be placed on the downwind side.
- Two agents that can be sprayed over impacted soil have been determined to be effective in controlling emissions. They include odor suppressant solution BioSolve™, and hydro mulch. These agents may be used where tarps cannot be effectively deployed over the source material, or where tarps are ineffective in controlling odors:
 - BioSolve™ can provide immediate, localized control of odor emissions.
 - Hydromulch - Although it is unlikely that it will be necessary, modified hydromulch slurry may be used to cover inactive sources for extended periods of time (up to several days). The hydromulch, typically cellulose fibers (HydroSeal®), is modified by mixing a tackifier (glue) with the mulch and water to form a slurry. It is applied using a standard hydroseed applicator to a thickness of ¼ inch. The material forms a sticky, cohesive, and somewhat flexible cover. Reapplication may be necessary if the applied layer becomes desiccated or begins to crack.

3.4 Building Controls

Controls for minimizing the impacts to occupied buildings include deferral of work to times when building occupants are not present or at a minimum.

4. Documentation and Reporting

The attached Daily Data Sheet will be filled out each day to record all of the details of the CAMP work. The form will be used to record the following information:

- Date and weather, with significant changes noted which may affect the positioning of the meters or recording of the data;
- Calibration results for the instruments;
- Locations of the upwind and downwind monitoring stations, and any changes made to the locations during the day to adjust for changing work locations or wind directions; and
- Any significant readings made during the day, such as exceedances which occur and their causes.

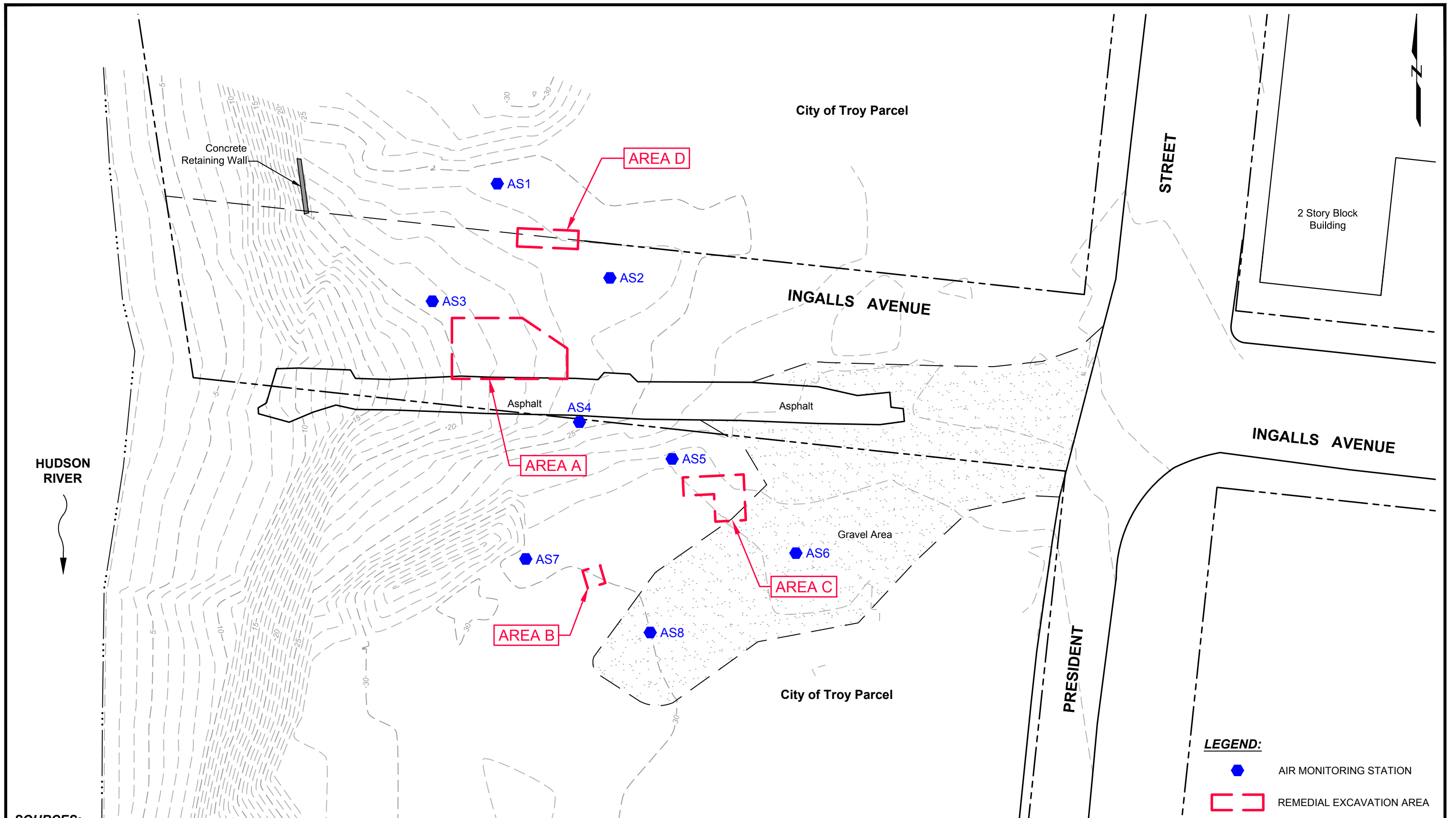
Additional information will be noted in the project fieldbook(s), as necessary.

The electronic measurements from the PIDs and dust meters will be downloaded each day, reviewed, and archived. Exceedances of the action levels, if any, and the actions to be taken to mitigate the situations, will be discussed immediately with the on-site representatives, or reported within one business day to the NYSDEC project manager (if on-site NYSDEC oversight is not provided). The results of the daily CAMP monitoring will also be discussed in the daily written report to the NYSDEC project manager. Summaries of all air monitoring data will be provided to the NYSDEC or the NYSDOH upon request.

CAMP odor monitoring results will be recorded in the field log book and/or the Daily Data Sheet, and will also be available for review by the state agencies.

Attachment A

Community Air Monitoring Daily Data Sheet



LEGEND:

- ◆ AIR MONITORING STATION
- REMEDIAL EXCAVATION AREA

- SOURCES:**
1. Plan Based On Map Titled *Former MGP Site, Ingalls Avenue & President Street, City Of Troy - Rensselaer County, State Of New York*, Prepared By Delta Engineers, Architects & Land Surveyors, Scale 1" = 20', Date: May18, 2017.
 2. Figures 3 & 6 from *Record of Decision, NM - Troy Smith Ave. MGP, Operable Unit Numbers 02, 03, Ingalls Avenue Purifier Waste, Hudson River Sediments, Troy, Rensselaer County, Site No. 442030*, Prepared by Tetra Tech EC, Inc., Date: March 2011.

Remedial Action Work Plan - Community Air Monitoring Plan
 Ingalls Avenue Area - OU2
 Troy Smith Avenue Former MGP Site
 Troy, New York

nationalgrid

GEI Consultants

Project 116830

PRELIMINARY CAMP LOCATIONS

December 2017

Fig. 1

Appendix C

Health and Safety Plan



Consulting
Engineers and
Scientists

Health and Safety Plan

OU2 Ingalls Avenue Area
Troy (Smith Ave.) Former Non-Owned MGP Site
Troy, New York

Prepared For:

National Grid
300 Erie Boulevard West
Syracuse, NY 13202

Submitted by:

GEI Consultants, Inc., P.C.
1301 Trumansburg Road, Suite N
Ithaca, NY 14850
607-216-8955

Project No. 116830.1405.14052

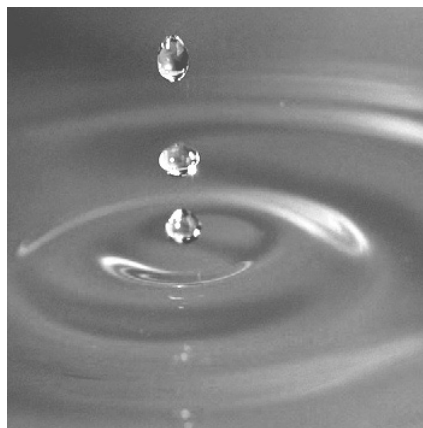


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1. Emergency Contact Information

Table 1. Emergency Contact Information

Important Phone Numbers	
Local Police:	911 or 518-270-5252
Fire Department:	911
Ambulance:	911
State Police or County Sheriff:	911
Hospital and Occupational Clinic Information <i>(See Attached Maps and Directions in Appendix A)</i>	
Saint Mary's Hospital/Seton Hall: 1300 Massachusetts Avenue Troy, NY 12180	(518) 268-5517
Concentra: 10B Madison Avenue Extension Albany, NY 12203	(518) 452-7030
Contacts	
GEI Project Manager: PJ Snyder	(781) 721-4085 office (781) 424-9929 cell
GEI Corporate Health and Safety Officer: Steve Hawkins	(860) 368-5348 office (860) 916-4167 cell
GEI Regional Health and Safety Officer Jeena Sheppard	(856) 291-5663 office (856) 298-7138 cell
GEI Engineer: Aaron Gorges	(607) 216-8964 office (607) 592-9221 cell
Medcor Triage	1-800-775-5866
National Grid Contact: Stephen Beam	(315) 428-5690 office (315) 663-5304 cell
Other Information	
Contractor Requesting/Performing Utility Clearance: Utility Clearance Ticket Number:	TBD
Nearest Telephone Location (or alternate means of communication)	On-site Cellular

2. Background

Project Name: Project Name: OU2 Ingalls Avenue Area – Troy (Smith Ave)
Former MGP Site

Project Location: Troy, NY

GEI Project No: 116830.1405.14052

This Health and Safety Plan (HASP) establishes policies and procedures to protect GEI personnel from the potential hazards posed by the activities at the OU2 Ingalls Avenue Area – Troy (Smith Ave.) Former Manufactured Gas Plant (MGP) Site in Troy, 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. Additionally, federal, state and local representatives, as well as National Grid employees may be required to sign and adhere to this HASP, depending on the nature of their presence on site during activities conducted by GEI. 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 (formerly known as Material Safety Data Sheets [MSDS]), specific to chemicals that may be encountered while working at the Site, are included 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.

Employees should review National Grid's Safety Procedure and Contractor Safety Requirements for reference. This document represents policies and safety-related work methods unique to National Grid and they may be more stringent than OSHA regulations. Contractors must follow these requirements as well as their own rules or regulations that meet or exceed OSHA and other regulatory requirements.

2.1 Scope of Field Work

A remedial action will be performed to excavate identified purifier residuals in the identified excavation areas for OU2. The remedial action will include the excavation of impacted soils and then the backfill of the excavated areas with clean fill material.

2.2 Site Description

The Site is located in Troy, Rensselaer County, New York. More detailed information on the site location can be found in the OU-2 Remedial Action Work Plan, which is attached. The subject of this work is the upland portion of the Ingalls Avenue site, adjacent to the Hudson River. The upland area has been designated as OU-2 and occupies a total of approximately 3.8 acres comprising a portion of Ingalls Avenue extension which is owned by the City of Troy.

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

The potential hazards associated with site conditions and activity hazards related to GEI on-site activities have been identified in this section.

4.1 Special Site Conditions or Concerns

- Traffic – The majority of traffic on the project site will be construction traffic and heavy trucks.
- Excavation/Backfill Equipment – Specific attention given to heavy equipment, pinch points, and overhead equipment.
- Bio-hazards (insect bites, poison ivy, etc.)
- Difficult site access – Site access is moderate due to partially paved roads and some steeper slopes.
- Hazardous winter conditions – Cold stress, slippery surfaces, and icy conditions are possible dangers.

Safety equipment will include: First aid kit, fire extinguisher, eye wash bottles, adequate supply of drinking water and electrolyte fluids, hand cleaner, insect repellent, sunscreen, and cell phone.

4.2 Activity Hazard Analysis

The potential hazards for this project associated with site conditions and activity hazards associated with GEI on-site activities have been identified in Table 2. General hazards and control measures that are applicable to all site activities are identified in the General Hazards section. The site-specific tasks, potential hazards, and control measures established to reduce the risk of injury or illness are identified in the Activity Hazard section of Table 2. Health and Safety SOPs for routine hazards and common site conditions are referenced in the table below and included in Appendix E.

Table 2. Activity Hazard Analysis

General Hazards These Hazards Apply to All Site Activities	Control Measure
Chemical / Contaminant Exposure – Skin and eye injury/irritation	<ul style="list-style-type: none"> • 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.
Cold Stress – Hypothermia, Frostbite	<ul style="list-style-type: none"> • 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 or 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)
Driving –	<ul style="list-style-type: none"> • Employees must wear their safety belt while in a moving vehicle. • Vehicle accidents will be reported in accordance with GEI’s accident reporting procedures. • Vehicles will be properly maintained and safely operated (refer to GEI’s Fleet Maintenance Program). • Employees will follow safe driving behaviors, which include limiting distractions such as manipulating radios or other equipment that may cause a distraction. Employees should not exceed the posted speed limit and should maintain a safe distance between other vehicles. • Use defensive driving techniques. • Driving distance and time after a 12-hour shift should not exceed 30 miles or 30 minutes (whichever is greater). • See SOP HS-004
Dusty Conditions – Eye and respiratory irritation	<ul style="list-style-type: none"> • Avoid travel at extreme times • Wear protective gear – dust masks, safety glasses

<p>Heat stress – Fainting, Fatigue, Heat Stroke</p>	<ul style="list-style-type: none"> • 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
<p>Inclement Weather</p>	<ul style="list-style-type: none"> • Listen to local forecasts for warnings about specific weather hazards such as tornados, thunder storms, and flash floods. • If the storms produce thunder and/or lightning, leave the work area immediately and move to a safe area. • Discuss an action plan prior to the severe weather. • Wear appropriate PPE for the type of weather that could be encountered. • Stop work until conditions are suitable. Take cover in vehicles or shelter as appropriate. • See SOP HS-010
<p>Insects – Bites, Stings, Allergic Reactions</p>	<ul style="list-style-type: none"> • Apply insect repellent prior to performing field work and as often as needed throughout the work shift • Wear proper protective clothing (work boots, socks and light colored clothing) • Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for long periods of time, or when many insects are most active (between dawn and dusk). • When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible • Field personnel who may have insect allergies should have bee sting allergy medication on site and should provide this information to the SSO and the CHSO prior to commencing work. • Field personnel should perform a self-check at the end of the day for ticks. • See SOP HS-001
<p>Noise</p>	<ul style="list-style-type: none"> • Maintain distance from the source of the noise. • Wear appropriate hearing protection when working in loud environments.

<p>Physical Injury – Slips, Trips and Falls</p>	<ul style="list-style-type: none"> • 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 performing 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.
<p>Repetitive Motion Injury – Standing, Squatting, and Bending Over</p>	<ul style="list-style-type: none"> • Take regular breaks and do not work in unusual positions for long periods of time. • Walk and stretch between tasks.
<p>Unsecured or High Crime Areas</p>	<ul style="list-style-type: none"> • Be aware of your surroundings. • Use the buddy system. Do not remain on site alone. Accompany or be accompanied by others to vehicles. • Request police detail when appropriate. • Let the Site Safety Officer (SSO) know when you begin work in these areas and when you leave. • Call in regularly. • 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.
<p>Utilities – Shock, Electrocution, Fire, Explosion</p>	<ul style="list-style-type: none"> • A thorough underground utility survey must be conducted prior to intrusive activities. Coordination with utility locating services, property owner(s) or utility companies must be conducted. • Utilities are to be considered live or active until documented otherwise. • For overhead utilities within 50 feet, determine with the utility company the appropriate distance. Minimum distance for clearance is based on voltage of the line. • If exposing a utility, proper support and protection must be provided so that the utility will not be damaged. • If a gas line is contacted, the contractor must notify police, fire, and emergency personnel, and evacuate employees according to the site evacuation procedures. No attempt should be made to tamper with or correct the damaged utility.

	<ul style="list-style-type: none"> • See SOP HS-014
Vehicular Traffic – Struck by injury, crushing	<ul style="list-style-type: none"> • Increase visibility of the work area to others by using cones, flags, barricades, proper lighting and caution tape to define work area. • Use a "spotter" to locate oncoming vehicles. • Use vehicle to block work area. • Engage police detail for all work conducted in appropriate areas. • Wear high-visibility, reflective vest at all times. • Maintain minimum DOT defined distances to other traffic lanes. • See SOP HS-016.

Activity	Potential Hazard	Control Measures
Construction Site Entry	Struck-by, caught-in-between equipment, crushing, pinch points	<ul style="list-style-type: none"> • 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.
MGP Purifier Impacted Soil Management	Contaminant Exposure	<ul style="list-style-type: none"> • Wear proper PPE during sampling including Tyvek or Tyvek apron with sleeves, Nitrile gloves, and face shield/safety glasses.
Drilling Oversight/Sampling	Contaminant Exposure, Noise, Contact with Utilities, Cuts/Scrapes, Heavy Lifting, Repetition, Slips/Trips/Falls	<ul style="list-style-type: none"> • Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or composite toe and shank; safety glasses; Nitrile/neoprene gloves; and earplugs. • Confirm utility locate has been completed. • Confirm adequate clearance from overhead utilities. • Dispose of gloves after use and wash hands. • Take regular breaks and do not work in unusual positions for long periods of time. • Keep trafficked areas free from slip/trip/fall hazards.

Activity	Potential Hazard	Control Measures
<p>Drum Handling</p>	<p>Contaminant Contact • Wear proper PPE during sampling including nitrile gloves and safety glasses. Cuts or Abrasions Heavy Lifting, Slips/Trips/Falls</p>	<ul style="list-style-type: none"> • Wear proper PPE during sampling including nitrile gloves and safety glasses and face shield as appropriate. • Use proper dollies or drum moving tools. • Use applicable tools to open/close drum lids. • Do not handle drums with bulging sides. • Dispose of gloves after use and wash hands. • Wear work gloves over nitrile gloves. • Use proper lifting techniques. • Ask fellow worker for help. • Keep trafficked areas free from slip/trip/fall hazards.
<p>Excavation and Trenching Oversight</p>	<p>Crushing, entrapment, falls</p>	<ul style="list-style-type: none"> • Prior to excavating, determine utility locations and have locations marked by utility companies and the property owner. • Utilities shall be properly supported and barriers should be erected around excavations in remote areas. • Backfill temporary excavations when work is completed. • Personnel must remain 2 feet from the face of the excavation. • Sides, slopes, and faces shall meet OSHA requirements. • Excavation entry will be allowed only with proper sloping or shoring. • See SOP HS-006
<p>Heavy Lifting</p>	<p>Back injury, knee injury</p>	<ul style="list-style-type: none"> • 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.
<p>Heavy Equipment – Working Near</p>	<p>Struck-by, caught-in-between equipment, crushing, pinch points</p>	<ul style="list-style-type: none"> • 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.

Activity	Potential Hazard	Control Measures
Mobile Equipment Use	Falls, crushing	<ul style="list-style-type: none"> • Inspect equipment prior to use. • Use equipment in accordance with manufacturer’s specifications and instructions. • Wear appropriate PPE including: hard hat, gloves, steel toed/shank safety boots, safety glasses and high visibility reflective clothing. • Unauthorized personnel will not be permitted to ride on equipment unless it is equipped to accommodate passengers safely. • The GEI operator will make sure the warning signal is operating when the equipment is backing up. • Wear seat belts and adjust them for a proper fit. • See SOP HS-021
Soil Sampling/Soil Vapor Sampling	Contaminant Exposure, Cuts/Scrapes, Heavy Lifting, Repetition, Slips/Trips/Falls	<ul style="list-style-type: none"> • Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or composite toe and shank; safety glasses; Nitrile/neoprene gloves; and earplugs as necessary. • Dispose of gloves after use and wash hands. • Wear work gloves over nitrile gloves. • Excavation entry will be allowed only with proper sloping or shoring. • Take regular breaks and do not work in unusual positions for long periods of time. • Keep trafficked areas free from slip/trip/fall hazards.
Waste Characterization	Contaminant Contact Cuts or Abrasions, Slips/Trips/Falls	<ul style="list-style-type: none"> • Wear proper PPE during sampling including nitrile gloves and safety glasses. • Dispose of gloves after use and wash hands. • Wear work gloves over nitrile gloves. • Keep trafficked areas free from slip/trip/fall hazards.
Working near Water	Drowning, hypothermia	<ul style="list-style-type: none"> • While working near water stay inside guard rails and or barriers. • While working out of out of safety zones a personal flotation device (PFD) must be worn at all times and an approved 30-inch ring buoys will be readily available for emergency rescue operations. • Use appropriate fall protection. • Buddy system shall be in use. • See SOP HS-017

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 on-site 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 and the Project Manager (PM).

4.3 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.crimereports.com: No crimes identified in the past 30 days within a mile of the Site, however, the site lists multiple sex offenders within 1 mile of the site.
- www.cityrating.com/crimestatistics.asp: Crime in Troy, NY is significantly greater than the New York and national averages.
- www.crimemapping.com: No 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 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 Safety Team (Corporate Health and Safety Officer and Regional Health and Safety Officers _SafetyTeam@geiconsultants.com) 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 on-site. Confirmation of cellular phone operation will be confirmed at the start of each working day.

4.3.1 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.

4.3.2 Electrical Hazards

4.3.2.1 Grounding Mobile Equipment

When mobile equipment requires grounding, it shall be solidly grounded by means of appropriate sized copper cable while using rubber gloves. The cable shall be fastened to a securely attached clean metallic portion of the equipment, or shall be fastened to a grounding stud provided for the purpose at one end and an adequate ground at the other end.

Non insulated booms such as digger derricks that have the possibility of encroaching the minimum approach distance shall be grounded and barricaded. The ground is to trip the circuit and the barricade is to protect anyone who may become in contact with the truck during this energization.

4.3.2.2 Utilities

The Site has 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.

4.3.2.3 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.

4.3.2.4 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.

4.3.3 *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>Dig Safely NY 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.
- Atmospheres are to be tested with a properly calibrated Combustion Gas Indicator (CGI) or Gas Measurement Instrument (GMI) in accordance with National Grid excavation procedures as required.

Employees will refer to GEI's Excavation Safety SOP for further information.

4.3.4 Fire and Explosion

The use of excavation equipment and tools that are gasoline powered presents the possibility of fire and explosion hazards. Underground/underwater utility lines also present fire and explosion hazards. Prior to the start of any work, all underground utilities and piping that may pose a potential hazard will be identified and located. The One Call center (Dig Safely, NY) will be called and underground utilities will be located and marked in OU-2 and along the shoreline, and their orientation under the river will be determined. In the event a pipe or line is struck, work will stop and the emergency response plan will be implemented.

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.

4.3.5 Heat Stress

Employees may be exposed to the hazards associated with heat stress when ambient temperatures exceed 70°F. 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.

4.3.6 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.

4.3.7 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 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.

4.3.8 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 Circuit Interrupter (GFCI)-equipped circuits will be used for power tools.

4.3.9 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.

4.3.10 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.

4.3.11 *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.

4.3.12 *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 through the object and away from your body; 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.

4.3.13 *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-019). 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.

4.3.14 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 exist, especially in locations containing tidal water flow.

4.4 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.

4.4.1 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.

4.4.2 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.

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.

4.4.3 Coal Tar and Coal Tar Products

Coal tar impacted soils have not been identified at OU2. However, the management of the soil and the appropriate Health and Safety procedures are included below should coal tar impacted soil be encountered in the remedial excavations.

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)perylene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3cd)pyrene, 2-methyl naphthalene, naphthalene, 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.

4.4.4 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 policy to monitor for hydrogen cyanide during earth-disturbing activities at sites where MGP-related contaminants have been found.

4.4.5 Heavy Metals

Exposure to high concentrations of arsenic can cause dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, and hyper pigmentation of skin. Chronic exposure to arsenic has resulted in lung cancer in humans.

Exposure to high concentrations of copper through inhalation can cause irritation of the eyes, nose, pharynx, nasal septum. Ingestion may cause a metallic taste. Skin irritation may result from direct contact with skin. Damage to the liver and kidneys may occur.

No adverse health effects are associated with environmental exposure to iron. Target organs for iron via ingestion of iron (most often in supplement form) are the liver, cardiovascular system, and kidneys. Exposure to high concentrations of iron through ingestion can cause salivation nausea, vomiting, diarrhea, and abdominal pain.

Exposure to high concentrations of manganese can cause manganism, metal fume fever, flu-like fever, and kidney damage.

Exposure to high concentrations of nickel may cause sensitization dermatitis, allergic asthma, and pneumonitis. Exposure to mercury can cause dizziness, salivation nausea, vomiting,

diarrhea, constipation, emotional disturbance, and kidney injury. Chronic exposure to mercury can cause CNS damage.

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 could cause bronchial irritation, gastrointestinal distress, excessive fatigue, and skin discoloration.

Exposure to high concentrations of zinc through ingestion can cause abdominal pain, nausea, vomiting, and diarrhea. Chronic exposure can lead to low blood pressure, jaundice, and seizures.

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.

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Arsenic	7440-38-2	0.01 mg/m ³	0.01 mg/m ³ A.L. 0.05 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-gray or tin-white, brittle, odorless solid FP: NA IP: NA LEL: NA UEL: NA 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
Copper (as a fume)	1317-38-0	NIOSH REL: TWA 0.1 mg/m ³	TWA 0.1 mg/m ³	Inhalation, skin and/or eye contact	Irritation eyes, upper respiratory system; metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion); metallic or sweet taste; discoloration skin, hair	Eyes, skin, respiratory system (increased risk with Wilson's disease)	Finely divided black particulate dispersed in air FP: NA IP: NA LEL: NA UEL: NA VP: 0 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	74-90-8	4.7 ppm (5 mg/m ³) STEL [skin]	10 ppm (11 mg/m ³) [skin]	Inhalation Ingestion Absorption Skin/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 78°F) with a bitter, almond-like odor. VP: 630 mmHg IP: 13.60 eV

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Hydrogen sulfide	7783-06-4	10 ppm TWA, 15 ppm STEL	20 ppm C, 50 ppm [10-min. Maximum peak]	Inhalation Skin/Eye Contact	Irritation 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. VP: 17.6 atm IP: 10.46 eV
Iron	1309-37-1	Iron oxide dust and fume: (Fe ₂ O ₃) as FE: 5mg/m ³ (TWA)	Iron oxide dust and fume: 10mg/m ³	Inhalation, ingestion, eye contact	Respiratory tract irritation, coughing, shortness of breath, overdose of iron may cause vomiting, abdominal pain, bloody diarrhea, vomiting blood, lethargy, and shock; acidity in the blood, bluish skin discoloration, fever, liver damage, and possibly death; eye and cornea irritation and discoloration.	Eyes, respiratory system, GI tract, liver	Reddish brown solid FP: NA LEL: NA UEL: NA VP: 0 mmHg
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; pal eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist and ankles; irritates eyes, hypo tension	Eyes, GI tract, CNS, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. FP: NA IP: NA LEL: NA UEL: NA VP: 0 mm

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Manganese	7439-96-5	TWA 1 mg/m ST 3 mg/m ³	C 5 mg/m ³	Inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; lowback pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	Respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. FP: NA LEL: NA UEL: Na VP: 0 mmHg
Naphthalene	91-20-3	10 ppm (52 mg/m ³) TWA, 15 ppm (79 mg/m ³) STEL	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, central nervous system	FP: 174 F IP: 8.12 eV, LEL: 0.8% UEL:6.7%, VP: 0.08 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: NA IP: NA LEL: NA UEL: NA 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

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
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, Central Nervous System, GI tract, blood, liver, kidneys	FP: 90°F LEL: 0.9% UEL: 6.7% VP: 9 mm
Zinc	1314-13-2	5 mg/m ³ (TWA), 10 mg/m ³ (STEL) for zinc oxide fume	10 mg/m ³ (TWA), for zinc oxide fume	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Respiratory system	Colorless liquid FP: NA? IP: 11 eV LEL: 7.5% UEL: 12.5% VP: 100 mmHg

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

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

IP = Ionization Potential

LEL = Lower explosive limit

mg/m³ = micrograms per cubic meter

min = minute

mm = millimeter

mmHg = millimeters of mercury

N/A = not applicable

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)

Table 3. Chemical Data

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
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HCN = Hydrogen Cyanide
hr = hour

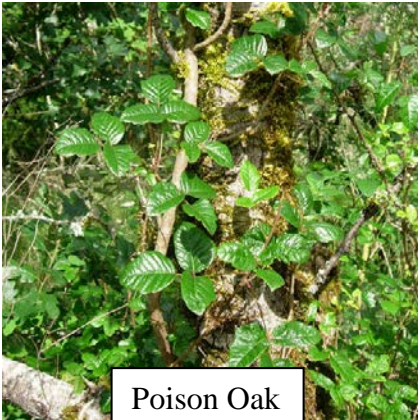
TWA = Time-weighted average (8 hours)
VP = vapor pressure approximately 68°F in mm Hg

4.5 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:

4.5.1 *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.



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.

4.5.2 Ticks

4.5.2.1 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 joint pain
- Swollen lymph glands
- Characteristic skin rash (i.e. bullseye rash)

4.5.2.2 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 6th 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.

4.5.2.3 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 Safety Team for evaluation.

4.5.3 ***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.

4.5.4 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 barbed. 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.

4.5.5 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 (Table 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 9 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

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

On-site 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 on-site 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.

6. Key Project Personnel/Responsibilities and Lines of Authority

6.1 GEI Personnel

- | | |
|-----------------------|-------------------------------------|
| • PJ Snyder, P.E. | GEI Project Manager |
| • Daniel Kopcow, P.E. | GEI Project Engineer |
| • James Edwards, P.G. | GEI Project Senior Geologist |
| • Aaron Gorges | GEI Site Manager/CM/SSO |
| • Jerry Peake | Field Personnel |
| • Garrett Schmidt | Field Personnel |
| • Steve Hawkins | Corporate Health and Safety Officer |
| • Jeena Sheppard | 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, Regional Health and Safety Officer (RHSO), the SSO, other GEI personnel implementing the proposed scope of work.

6.1.1 *GEI Project Manager*

The PM, PJ Snyder, 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 Safety Team;
- 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 on-site 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 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, Aaron Gorges, will serve as the SSO. The SSO will be on-site 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 regular 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 on-site work;
- Attending and actively participating in the required Project Safety Briefing prior to beginning on-site 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 Site OU2 Ingalls Avenue Area – Troy (Smith Ave.) 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 the National Grid 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

GEI has subcontracted the following firms to assist in performing work on this project:

Subcontractor Name	Contact Name
TBD	TBD
	Office: TBD
	Cell: TBD

GEI requires its subcontractors to work in a responsible and safe manner. Subcontractors hired by GEI are required to submit documentation of their safety practices as part of GEI’s Subcontractor Management Program for evaluation and approval before the start of work. 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 Safety Team at SafetyTeam@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 on-site.

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.

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. 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. Atmospheric 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 will conduct work zone monitoring for on-site GEI employees during intrusive activities only. 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 Safety Team.***

The following air monitoring equipment will be on site:

- 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)
- Multi-gas meter: lower explosive limit (LEL) / oxygen (O₂) / hydrogen sulfide (H₂S) / meter

9.1 Equipment Use

9.1.1 Calibration

Air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements. Calibrations will be recorded in the project notes daily or on a daily calibration form.

9.1.2 Photoionization Detector

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.

9.2 Particulate Meter

A particulate 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 off-site sources are considered to be the source of the measured dust, upwind readings will also be collected.

9.2.1 *Multi-Gas Meter*

A multi-gas meter will be used to monitor for combustible gases and O₂ content in the work zone during intrusive activities. The meter will also be equipped with an H₂S sensor and an HCN sensor. H₂S monitoring will be completed every 15 minutes or, if a sulfur odor is present, monitoring will be continuous.

9.3 Action Levels

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). O₂ 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	Action Level (above background)	Site Action
PID	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	1.0 - 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 Safety Team.
O ₂ Meter	< 20.7%	Stop work, withdraw from work area, ventilate area, notify PM and Safety Team.
	> 21.1%	Stop work, withdraw from work area, notify PM and Safety Team.
H ₂ S Meter	< 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 Safety Team.
HCN Meter	< 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 Safety Team. 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 least 25 ppm upwind of the excavation until continuous meter reads less than 1 ppm, notify PM and Safety Team. 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.
Lower Explosive Limit	< 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 Safety Team.
Carbon Monoxide	> 35 ppm	Stop work, withdraw from work area, ventilate area, notify PM and Safety Team.
Particulate Meter	150 µg/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 on-site person. The other on-site 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

Sanitation requirements identified in the OSHA Standard 29 CFR 1926.51 “Sanitation” specifies that employees working at temporary project sites have at least one sanitary facility available to them. Temporary sanitary facilities including toilets will be available on-site.

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 work areas do not meet illumination requirements, they will be equipped with appropriate illumination that meets or exceeds requirements specified in OSHA Standard 29 CFR 1926.56 “Illumination.” Employees will not work on sites that are not properly lighted.

10.5 Smoking

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.

10.6 Alcohol and Drug Abuse Prevention

Alcohol and drugs will not be allowed on the Site. Project personnel under the influence of alcohol or drugs will not be allowed to enter the Site.

11. Incident 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, chemical spills, vehicle accidents, and property damage. The person reporting the incident is the Incident Reporter. The following steps must be followed when an incident occurs:

1. In life-threatening situations, immediately call 9-1-1.
2. Stop work activity to address any injury, illness, property damage, spill or other emergency.
3. **Immediately** report any incidents to your Supervisor/Project Manager and a Regional Health & Safety Officer.
4. The PM will immediately (or no later than 1 hour) inform the CHSO and the Project-Specific National Grid Representative of any accident, incident, injury or near miss.
5. If your injury or illness is not life-threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional.
6. Complete an Incident Report Form **immediately** after addressing the incident. Figures, photographs and/or sketches should be included within the Incident Report.
7. A DRAFT Incident Report Form including root cause/corrective actions will be completed by a member of the Safety Team and submitted to the Project-Specific National Grid Representative within **4 hours**.
8. A FINAL Incident Report will be submitted within 24 hours via e-mail to the Project-Specific National Grid PM, National Grid Regional Safety Lead, and/or the person to whom the verbal notification was initially provided.

All work will be suspended until contact is made with the Project-Specific PM so that National Grid can assess if continued work suspension or if a stand down is necessary. If the National Grid PM cannot be reached, contact the National Grid SIR Regional Safety Lead as noted in the table below.

Name	Region	Phone Numbers	E-Mail
Brian Stearns	Upstate NY	W- (315) 428-5731 C - (315) 461-7892	Brian.Stearns@nationalgrid.com
Elizabeth Greene	MA/RI	W- (781) 907-3656 C - (781) 248-6469	Elizabeth.Greene@nationalgrid.com

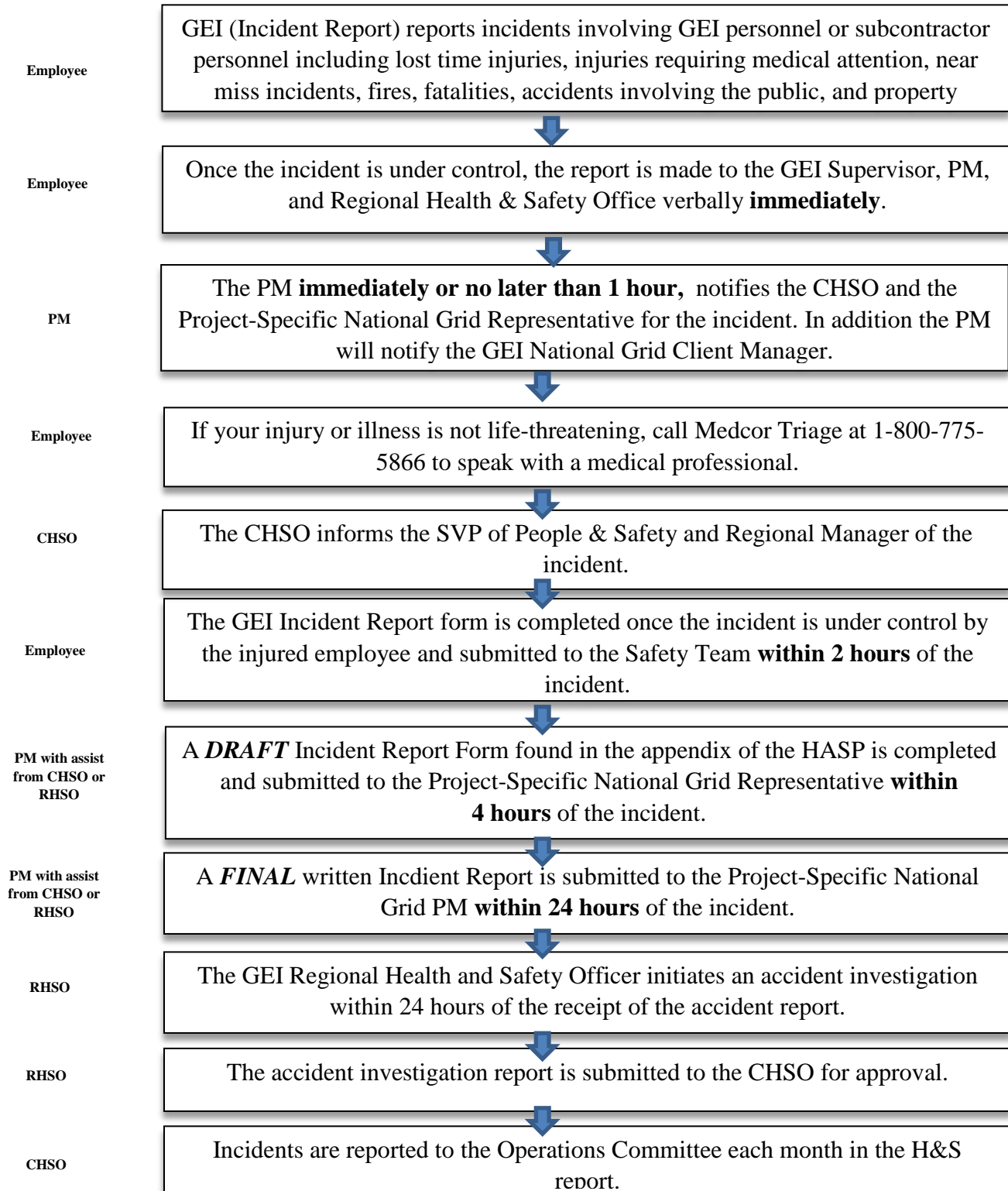
For vehicle accidents involving another vehicle or damage to property, the employee will take pictures of each vehicle or property involved in the incident and obtain a police report. In some municipalities police will not be dispatched to a non-injury accident, but every effort needs to be made to try and obtain the report. The Incident Report Form and the Near Miss

Reporting Form can be found in Appendix D, on the GEI Health and Safety smartphone app, or on the Safety page of the GEI Intranet. To report subcontractor injuries or incidents, follow the same verbal reporting procedures and submit an email describing the event to the PM and the Safety Team. A representative with knowledge of the incident should be available to provide incident information until the investigation is completed by National Grid.

11.1 Injury Triage Service

If a GEI employee experiences a work related injury that is not life-threatening, the employee will initiate a call to Medcor Triage at 1-800-775-5866. The injured employee will detail any medical symptoms or complaints which will be evaluated by a Registered Nurse (RN) specially trained to perform telephonic triage. The RN will recommend first aid self-treatment or refer the injured employee for an off-site medical evaluation by a health professional at a clinic within GEI's workers compensation provider network. GEI employees are still required to follow our Accident Reporting procedures as listed above.

11.2 Flow Chart for Accident Reporting



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 Safety Team. 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, on-site 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 Safety Team 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 Safety Team. 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 lightning.

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.

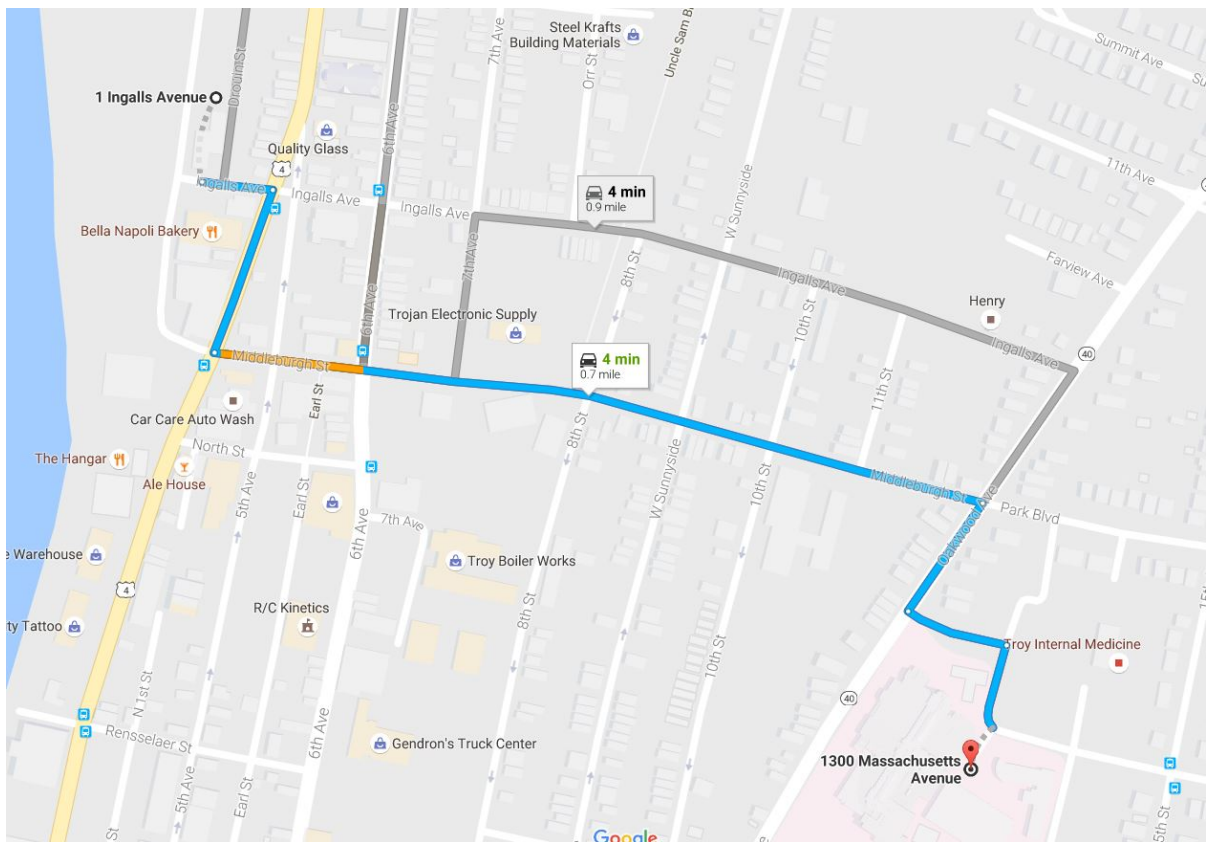
If the spill or release is determined to be within the on-site emergency response capabilities, the SSO will verify implementation of the necessary remedial action. If the release is beyond the capabilities of the Site personnel, personnel will be evacuated from the immediate area and the local fire department will be contacted. The SSO will notify the PM and the Safety Team.

Appendix A

Map to Hospital and Occupational Health Clinic

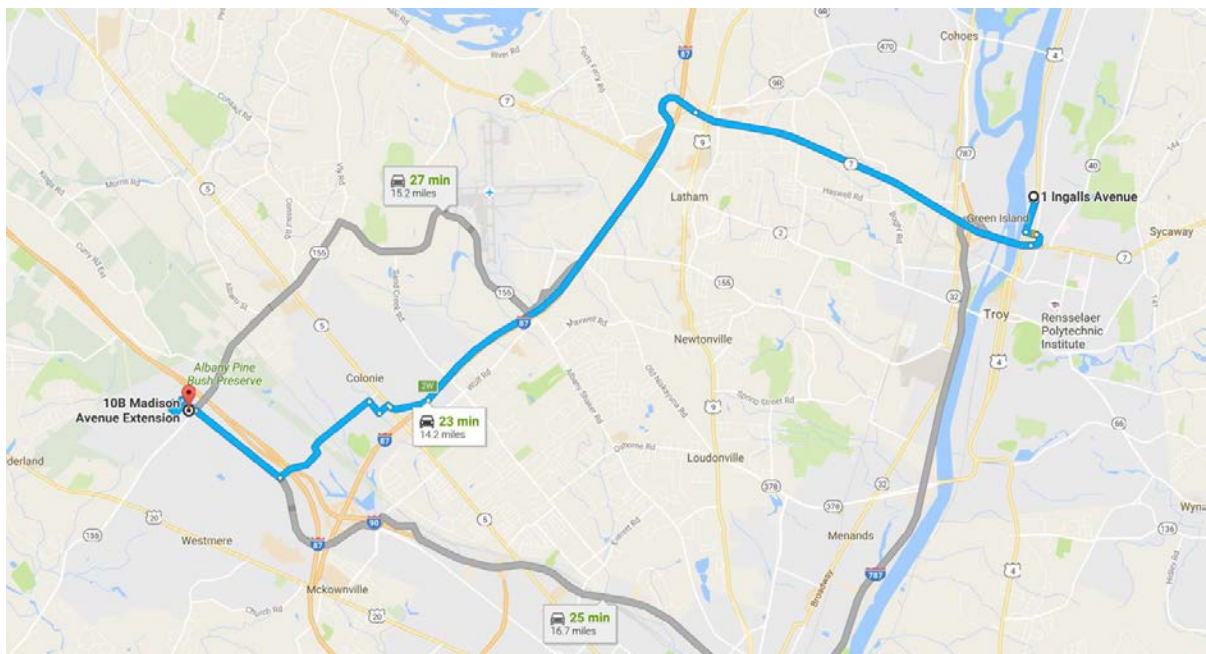
**HOSPITAL MAP TO:
Saint Mary's Hospital/Seton Health
1300 Massachusetts Avenue
Troy, NY
518-268-5517**

1. Head **east** on **Ingalls Avenue** towards River Street.
2. Turn **right** on to **River Street** – go 0.2 miles.
3. Turn **left** on to **Middleburgh Street** – go 0.5 miles.
4. Turn **right** on to **15th Street** – go 0.1 miles.
5. Turn **right** on to **Massachusetts Avenue** – go <0.1 miles.
6. Arrive at **1300 Massachusetts Avenue, Troy, NY**



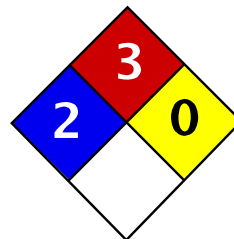
**DIRECTIONS TO:
Occupational Health Provider
Concentra
10B Madison Avenue Extension
Albany, NY 12203
518-452-7030**

1. Start out going **south** on **River St / US-4** toward **Douw St. 0.5 Mi**
2. Turn **left** onto **Jay St. 0.1 Mi**
3. Merge onto **RT-7 W** toward **I-787. 5.3 Mi**
4. Merge onto **I-87 S** via the exit on the **left** toward **Albany. 5.2 Mi**
5. Keep **left** to take **Adirondack Northway** toward **US-20 / Western Ave. 1.0 Mi**
6. Take the **Crossgates Mall Rd** exit. **0.2 Mi**
7. Keep **right** at the fork to go on **Crossgates Mall Rd. 0.2 Mi**
8. Turn **slight right. 0.2 Mi**
9. Merge onto **Washington Ave Ext** via the ramp on the **left. 2.1 Mi**
10. Stay **straight** to go onto **Madison Ave Ext. 0.05 Mi**
11. **10B MADISON AVE EXT.**



Appendix B

Safety Data Sheets



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C₆-H₆

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.

MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].

The substance is toxic to blood, bone marrow, central nervous system (CNS).

The substance may be toxic to liver, Urinary System.

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat.
Slightly flammable to flammable in presence of oxidizing materials.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire.
Reacts on contact with iodine heptafluoride gas.

Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition.
Contact with sodium peroxide with benzene causes ignition.
Benzene ignites in contact with powdered chromic anhydride.
Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:

Benzene vapors + chlorine and light causes explosion.
Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.
Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.
Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.
The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.
Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion.
Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States]
TWA: 1.6 STEL: 8 (mg/m³) from ACGIH (TLV) [United States]
TWA: 0.1 STEL: 1 from NIOSH
TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States]
TWA: 10 (ppm) from OSHA (PEL) [United States]
TWA: 3 (ppm) [United Kingdom (UK)]
TWA: 1.6 (mg/m³) [United Kingdom (UK)]
TWA: 1 (ppm) [Canada]
TWA: 3.2 (mg/m³) [Canada]
TWA: 0.5 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:

Aromatic. Gasoline-like, rather pleasant.
(Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone.

Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Benzene vapors + chlorine and light causes explosion.

Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.

Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.

Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.

The solution of permanganic acid (or its explosive anhydride, dimanganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.

Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion.

Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 930 mg/kg [Rat].

Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.

MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].

Causes damage to the following organs: blood, bone marrow, central nervous system (CNS).

May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:

Very hazardous in case of inhalation.

Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects.

May affect genetic material (mutagenic).

May cause cancer (tumorigenic, leukemia))

Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system.

Eyes: Causes eye irritation.

Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and

other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene

California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value)

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene

Connecticut carcinogen reporting list.: Benzene

Connecticut hazardous material survey.: Benzene

Illinois toxic substances disclosure to employee act: Benzene

Illinois chemical safety act: Benzene

New York release reporting list: Benzene

Rhode Island RTK hazardous substances: Benzene

Pennsylvania RTK: Benzene

Minnesota: Benzene

Michigan critical material: Benzene

Massachusetts RTK: Benzene

Massachusetts spill list: Benzene

New Jersey: Benzene

New Jersey spill list: Benzene

Louisiana spill reporting: Benzene

California Director's list of Hazardous Substances: Benzene

TSCA 8(b) inventory: Benzene
SARA 313 toxic chemical notification and release reporting: Benzene
CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable.
R22- Harmful if swallowed.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R45- May cause cancer.
R62- Possible risk of impaired fertility.
S2- Keep out of the reach of children.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S39- Wear eye/face protection.
S46- If swallowed, seek medical advice immediately and show this container or label.
S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

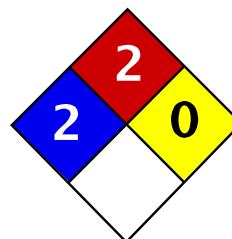
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 11/06/2008 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com 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 ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C₁₀H₈

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable solid.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Flammable solid.

Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

Israel: TWA: 10 (ppm)
TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995]
TWA: 52 STEL: 79 (mg/m³) from ACGIH [1995]
Australia: STEL: 15 (ppm)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:

Partially dispersed in hot water, methanol, n-octanol.

Very slightly dispersed in cold water.

See solubility in methanol, n-octanol.

Solubility:

Partially soluble in methanol, n-octanol.

Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 490 mg/kg [Rat].

Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of ingestion.

Hazardous in case of inhalation.

Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Rhode Island RTK hazardous substances: Naphthalene

Pennsylvania RTK: Naphthalene

Florida: Naphthalene

Minnesota: Naphthalene

Massachusetts RTK: Naphthalene

TSCA 8(b) inventory: Naphthalene

TSCA 8(a) PAIR: Naphthalene

TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87

SARA 313 toxic chemical notification and release reporting: Naphthalene: 1%

CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-4: Flammable solid.

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36- Irritating to eyes.

R40- Possible risks of irreversible effects.

R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed.

R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation.

R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

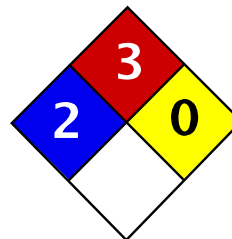
References: Not available.

Other Special Considerations: Not available.

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Last Updated: 10/11/2005 01:30 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat.

Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide;

concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States]

TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN

TWA: 100 STEL: 150 from NIOSH [United States]

TWA: 375 STEL: 560 (mg/m³) from NIOSH [United States]

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 2.7$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone.

Practically insoluble in cold water.

Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide.

Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride.

Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C.

Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 636 mg/kg [Rat].

Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose:

LDL [Human] - Route: Oral; Dose: 50 mg/kg

LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin.

Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days.

Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite.

Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation.

Chronic Potential Health Effects:

Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis.

Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)], 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may

arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene

California prop. 65 (no significant risk level): Toluene: 7 mg/day (value)

California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value)

California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene

Connecticut hazardous material survey.: Toluene

Illinois toxic substances disclosure to employee act: Toluene

Illinois chemical safety act: Toluene

New York release reporting list: Toluene

Rhode Island RTK hazardous substances: Toluene

Pennsylvania RTK: Toluene

Florida: Toluene

Minnesota: Toluene

Michigan critical material: Toluene

Massachusetts RTK: Toluene

Massachusetts spill list: Toluene

New Jersey: Toluene

New Jersey spill list: Toluene

Louisiana spill reporting: Toluene

California Director's List of Hazardous Substances.: Toluene

TSCA 8(b) inventory: Toluene

TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92

SARA 313 toxic chemical notification and release reporting: Toluene

CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable.

R20- Harmful by inhalation.

S16- Keep away from sources of ignition - No smoking.

S25- Avoid contact with eyes.

S29- Do not empty into drains.

S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/06/2008 12:00 PM

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Occupational Health Guideline for Coal Tar Pitch Volatiles

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

Anthracene

- Formula: $C_{14}H_{10}$
- Synonyms: None
- Appearance and odor: Pale green solid with a faint aromatic odor.

Phenanthrene

- Formula: $C_{14}H_{10}$
- Synonyms: None
- Appearance and odor: Colorless solid with a faint aromatic odor.

Pyrene

- Formula: $C_{16}H_{10}$
- Synonyms: None
- Appearance: Bright yellow solid

Carbazole

- Formula: $C_{12}H_9N$
- Synonyms: None
- Appearance and odor: Colorless solid with a faint aromatic odor.

Benzo(a)pyrene

- Formula: $C_{20}H_{12}$
- Synonyms: BaP, 3,4-benzopyrene

- Appearance and odor: Colorless solid with a faint aromatic odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for coal tar pitch volatiles is 0.2 milligram of coal tar pitch volatiles per cubic meter of air (mg/m^3) averaged over an eight-hour work shift. NIOSH has recommended that the permissible exposure limit for coal tar products be reduced to 0.1 mg/m^3 (cyclohexane-extractable fraction) averaged over a work shift of up to 10 hours per day, 40 hours per week, and that coal tar products be regulated as occupational carcinogens. The NIOSH Criteria Document for Coal Tar Products and NIOSH Criteria Document for Coke Oven Emissions should be consulted for more detailed information.

HEALTH HAZARD INFORMATION

- Routes of exposure
Coal tar pitch volatiles can affect the body if they are inhaled or if they come in contact with the eyes or skin.
- Effects of overexposure
Repeated exposure to coal tar pitch volatiles has been associated with an increased risk of developing bronchitis and cancer of the lungs, skin, bladder, and kidneys. Pregnant women may be especially susceptible to exposure effects associated with coal tar pitch volatiles. Repeated exposure to these materials may also cause sunlight to have a more severe effect on a person's skin. In addition, this type of exposure may cause an allergic skin rash.
- Reporting signs and symptoms
A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to coal tar pitch volatiles.
- Recommended medical surveillance
The following medical procedures should be made available to each employee who is exposed to coal tar pitch volatiles at potentially hazardous levels:

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of the oral cavity, respiratory tract, bladder, and kidneys should be stressed. The skin should be examined for evidence of chronic disorders, for premalignant and malignant lesions, and evidence of hyperpigmentation or photosensitivity.

—Urinalysis: Coal tar pitch volatiles are associated with an excess of kidney and bladder cancer. A urinalysis should be obtained to include at a minimum specific gravity, albumin, glucose, and a microscopic on centrifuged sediment, as well as a test for red blood cells.

—Urinary cytology: Coal tar pitch volatiles are associated with an excess of kidney and bladder cancer. Employees having 5 or more years of exposure or who are 45 years of age or older should have a urinary cytology examination.

—Sputum cytology: Coal tar pitch volatiles are associated with an excess of lung cancer. Employees having 10 or more years of exposure or who are 45 years of age or older should have a sputum cytology examination.

—14" x 17" chest roentgenogram: Coal tar pitch volatiles are associated with an excess of lung cancer. Surveillance of the lungs is indicated.

—FVC and FEV (1 sec): Coal tar pitch volatiles are reported to cause an excess of bronchitis. Periodic surveillance is indicated.

—A complete blood count: Due to the possibility of benzene exposure associated with coal tar pitch volatiles, a complete blood count is considered necessary to search for leukemia and aplastic anemia.

—Skin disease: Coal tar pitch volatiles are defatting agents and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be more susceptible to the effects of these agents.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis, and semi-annually for employees 45 years of age or older or with 10 or more years' exposure to coal tar pitch volatiles.

• Summary of toxicology

Coal tar pitch volatiles (CTPV) are products of the destructive distillation of bituminous coal and contain polynuclear aromatic hydrocarbons (PNA's). These hydrocarbons sublime readily, thereby increasing the amounts of carcinogenic compounds in working areas. Epidemiologic evidence suggests that workers intimately exposed to the products of combustion or distillation of bituminous coal are at increased risk of cancer at many sites. These include cancer of the respiratory tract, kidney, bladder, and skin. In a study of coke oven workers, the level of exposure to CTPV and the length of time exposed were related to the development of cancer. Coke oven workers with the highest risk of cancer were those employed exclusively at topside jobs for 5 or more years, for whom the increased risk of

dying from lung cancer was 10-fold; all coke oven workers had a 7-1/2-fold increase in risk of dying from kidney cancer. Although the causative agent or agents of the cancer in coke oven workers is unidentified, it is suspected that several PNA's in the CTPV generated during the coking process are involved. Certain industrial populations exposed to coal tar products have a demonstrated risk of skin cancer. Substances containing PNA's which may produce skin cancer also produce contact dermatitis; examples are coal tar, pitch, and cutting oils. Although allergic dermatitis is readily induced by PNA's in guinea pigs, it is only rarely reported in humans from occupational contact with PNA's; these have resulted largely from the therapeutic use of coal tar preparations. Components of pitch and coal tar produce cutaneous photosensitization; skin eruptions are usually limited to areas exposed to the sun or ultraviolet light. Most of the phototoxic agents will induce hypermelanosis of the skin; if chronic photodermatitis is severe and prolonged, leukoderma may occur. Some oils containing PNA's have been associated with changes of follicular and sebaceous glands which commonly take the form of acne. There is evidence that exposures to emissions at coke ovens and gas retorts may be associated with an increased occurrence of chronic bronchitis. Coal tar pitch volatiles may be associated with benzene, an agent suspected of causing leukemia and known to cause aplastic anemia.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data—Anthracene

1. Molecular weight: 178.2
2. Boiling point (760 mm Hg): 340 C (644 F)
3. Specific gravity (water = 1): 1.24
4. Vapor density (air = 1 at boiling point of anthracene): 6.15
5. Melting point: 217 C (423 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Not applicable

• Physical data—Phenanthrene

1. Molecular weight: 178.2
2. Boiling point (760 mm Hg): 340 C (644 F)
3. Specific gravity (water = 1): 1.18
4. Vapor density (air = 1 at boiling point of phenanthrene): 6.15
5. Melting point: 100.5 C (213 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Not applicable

• Physical data—Pyrene

1. Molecular weight: 202.3
2. Boiling point (760 mm Hg): Greater than 360 C (greater than 680 F)

3. Specific gravity (water = 1): 1.28
4. Vapor density (air = 1 at boiling point of pyrene): 6.9

5. Melting point: 150.4 C (303 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

• Physical data—Carbazole

1. Molecular weight: 167.2
2. Boiling point (760 mm Hg): 355 C (671 F)
3. Specific gravity (water = 1): Greater than 1
4. Vapor density (air = 1 at boiling point of carbazole): 5.8
5. Melting point: 246 C (475 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

• Physical data—Benzo(a)pyrene

1. Molecular weight: 252.3
2. Boiling point (760 mm Hg): Greater than 360 C (greater than 680 F)
3. Specific gravity (water = 1): Greater than 1
4. Vapor density (air = 1 at boiling point of benzo(a)pyrene): 8.7
5. Melting point: 179 C (354 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

• Reactivity

1. Conditions contributing to instability: None hazardous
2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions.
3. Hazardous decomposition products: None
4. Special precautions: None

• Flammability

1. Flash point: Anthracene: 121 C (250 F) (closed cup); Others: Data not available
2. Autoignition temperature: Anthracene: 540 C (1004 F); Others: Data not available
3. Flammable limits in air, % by volume: Anthracene: Lower: 0.6; Others: Data not available
4. Extinguishant: Foam, dry chemical, and carbon dioxide

• Warning properties

Grant states that "coal tar and its various crude fractions appear principally to cause reddening and squamous eczema of the lid margins, with only small erosions of the corneal epithelium and superficial changes in the stroma, which disappear in a month following exposure. Chronic exposure of workmen to tar fumes and dust has been reported to cause conjunctivitis and discoloration of the cornea in the palpebral fissure,

either near the limbus or, in extreme cases, across the whole cornea. Occasionally, epithelioma of the lid margin has been attributed to contact with coal tar."

MONITORING AND MEASUREMENT PROCEDURES

• General

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

• Method

Coal tar products may be sampled by collection on a glass fiber filter with subsequent ultrasonic extraction and weighing. An analytical method for coal tar pitch volatiles is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 1, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00267-3).

RESPIRATORS

• Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

• In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with condensed coal tar pitch volatiles, where skin contact may occur.

• If employees' clothing may have become contaminated with coal tar pitch volatiles, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing contaminated with coal tar pitch volatiles

should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of coal tar pitch volatiles from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the coal tar pitch volatiles, the person performing the operation should be informed of coal tar pitch volatiles's hazardous properties.

- Employees should be provided with and required to use splash-proof safety goggles where condensed coal tar pitch volatiles may contact the eyes.

SANITATION

- Workers subject to skin contact with coal tar pitch volatiles should wash with soap or mild detergent and water any areas of the body which may have contacted coal tar pitch volatiles at the end of each work day.

- Employees who handle coal tar pitch volatiles should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

- Areas in which exposure to coal tar pitch volatiles may occur should be identified by signs or other appropriate means, and access to these areas should be limited to authorized persons.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to coal tar pitch volatiles may occur and control methods which may be effective in each case:

Operation	Controls
Liberation from extraction and packaging from coal tar fraction of coking	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment
Use as a binding agent in manufacture of coal briquettes used for fuel; use as a dielectric in the manufacture of battery electrodes, electric-arc furnace electrodes, and electrodes for alumina reduction	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment
Use in manufacture of roofing felts and papers and roofing	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

Operation

Use for protective coatings for pipes for underground conduits and drainage; use as a coating on concrete as waterproofing and corrosion-resistant material; use in road paving and sealing

Use in manufacture and repair of refractory brick; use in production of foundry cores; use in manufacture of carbon ceramic items

Controls

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• Eye Exposure

If condensed coal tar pitch volatiles get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses should not be worn when working with these chemicals.

• Skin Exposure

If condensed coal tar pitch volatiles get on the skin, wash the contaminated skin using soap or mild detergent and water. Be sure to wash the hands before eating or smoking and to wash thoroughly at the close of work.

• Breathing

If a person breathes in large amounts of coal tar pitch volatiles, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

• Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of releases until cleanup has been completed.

- If coal tar pitch volatiles are released in hazardous concentrations, the following steps should be taken:
 1. Ventilate area of spill.

2. Collect released material in the most convenient and safe manner for reclamation or for disposal in sealed containers in a secured sanitary landfill.

• Waste disposal method:

Coal tar pitch volatiles may be disposed of in sealed containers in a secured sanitary landfill.

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RESPIRATORY PROTECTION FOR COAL TAR PITCH VOLATILES

Condition	Minimum Respiratory Protection* Required Above 0.2 mg/m ³
<p>Particulate and Vapor Concentration</p> <p>2 mg/m³ or less</p>	<p>A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high-efficiency filter.</p> <p>Any supplied-air respirator.</p> <p>Any self-contained breathing apparatus.</p>
<p>10 mg/m³ or less</p>	<p>A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high-efficiency filter.</p> <p>A gas mask with a chin-style or a front- or back-mounted organic vapor canister and with a full facepiece and a fume or high-efficiency filter.</p> <p>Any supplied-air respirator with a full facepiece, helmet, or hood.</p> <p>Any self-contained breathing apparatus with a full facepiece.</p>
<p>200 mg/m³ or less</p>	<p>A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.</p> <p>A powered air-purifying respirator with an organic vapor cartridge and a high-efficiency particulate filter.</p>
<p>400 mg/m³ or less</p>	<p>A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.</p>
<p>Greater than 400 mg/m³ or entry and escape from unknown concentrations</p>	<p>Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.</p> <p>A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.</p>
<p>Fire Fighting</p>	<p>Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.</p>
<p>Escape</p>	<p>Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class.</p> <p>Any escape self-contained breathing apparatus.</p>

*Only NIOSH-approved or MSHA-approved equipment should be used.



MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ISOBUTYLENE

1. Chemical Product and Company Identification

**BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974**

**BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6**

**TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300**

**TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101**

**PRODUCT NAME: ISOBUTYLENE
CHEMICAL NAME: Isobutylene
COMMON NAMES/SYNONYMS: 2-Methylpropene, Isobutene
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, B1, D2B**

**PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96**

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Isobutylene FORMULA: C ₄ H ₈ CAS: 115-11-7 RTECS #: UD0890000	99.0 to 99.8	Simple Asphyxiant	Simple Asphyxiant	LC ₅₀ 620 mg/m ³ /3H (rat)

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

² As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

This product does not contain oxygen and may cause asphyxia if released in a confined area. Simple hydrocarbons can cause irritation and central nervous system depression at high concentrations. flammable.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

PRODUCT NAME: ISOBUTYLENE

HEALTH EFFECTS:

Exposure Limits No	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

Irritation may occur.

SKIN EFFECTS:

None anticipated as product is a gas at room temperature.

INGESTION EFFECTS:

Ingestion is unlikely.

INHALATION EFFECTS:

Product is relatively nontoxic. Simple hydrocarbons can irritate the eyes, mucous membranes and respiratory system at high concentrations.

Inhalation of high concentrations may cause dizziness, disorientation, incoordination, narcosis, nausea or narcotic effects.

This product may displace oxygen if released in a confined space. Maintain oxygen levels above 19.5% at sea level to prevent asphyxiation.

Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

NFPA HAZARD CODES

Health: 1
Flammability: 4
Reactivity: 0

HMIS HAZARD CODES

Health: 1
Flammability: 4
Reactivity: 0

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:

Never introduce oil or ointment into the eyes without medical advice! If pain is present, refer the victim to an ophthalmologist for further treatment and follow up.

SKIN:

MSDS: G-53

Revised: 6/7/96

PRODUCT NAME: ISOBUTYLENE

Remove contaminated clothing and wash affected area with soap and water. If irritation persists, seek medical attention.

INGESTION:

Not normally required. Seek immediate medical attention.

INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given assisted (artificial) respiration and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. Fire Fighting Measures

Conditions of Flammability: Flammable liquid and vapor		
Flash point: -105 °F (-76 °C)	Method: Closed Cup	Autoignition Temperature: 869 °F (465 °C)
LEL(%): 1.8	UEL(%): 9.6	
Hazardous combustion products: Carbon monoxide, Carbon dioxide		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

FIRE AND EXPLOSION HAZARDS:

Isobutylene is heavier than air and may travel a considerable distance to an ignition source. Isobutylene is a flammable gas! Keep away from open flame and other sources of ignition. Do not allow smoking in storage areas or when handling.

EXTINGUISHING MEDIA:

Water, carbon dioxide, dry chemical.

FIRE FIGHTING INSTRUCTIONS:

If possible, stop the flow of gas with a remote valve. Use water spray to cool fire exposed containers. If fire is extinguished and flow of gas is continued, increase ventilation to prevent a build up of a flammable/ explosive atmosphere. Extinguish sources of ignition.

Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above the liquid level with remote monitors. Limit the number of personnel in proximity to the fire. Evacuate surrounding areas to at least 3000 feet in all directions.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. Increase ventilation to prevent build up of a flammable/explosive atmosphere. Extinguish all sources of ignition! If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location

PRODUCT NAME: ISOBUTYLENE

7. Handling and Storage

Earth bond and ground all lines and equipment associated with the product system. Electrical equipment should be non-sparking and explosion proof.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Post "No Smoking" signs in storage or use areas.

For additional recommendations consult Compressed Gas Association Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Isobutylene FORMULA: C ₄ H ₈ CAS: 115-11-7 RTECS #: UD0890000	99.0 to 99.8	Simple Asphyxiant	Simple Asphyxiant	LC ₅₀ 620 mg/m ³ /3H (rat)

¹ Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:

Use local exhaust to prevent accumulation. Use general ventilation to prevent build up of flammable concentrations. May use hood with forced ventilation when handling small quantities. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

EYE/FACE PROTECTION:

Safety goggles or glasses.

SKIN PROTECTION:

Protective gloves made of plastic or rubber.

PRODUCT NAME: ISOBUTYLENE

RESPIRATORY PROTECTION:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:

Safety shoes, safety shower, eyewash.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 70°F	: 39	psia
Vapor density at STP (Air = 1)	: 1.98	
Evaporation point	: Not Available	
Boiling point	: 19.5	°F
	: -6.9	°C
Freezing point	: -220.6	°F
	: -140.3	°C
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H2O)	: Insoluble	
Odor threshold	: Not Available	
Odor and appearance	: A colorless gas with an unpleasant odor similar to that of burning coal.	

10. Stability and Reactivity

STABILITY:

Stable

CONDITIONS TO A VOID (STABILITY):

None

INCOMPATIBLE MATERIALS:

Oxidizers

PRODUCT NAME: ISOBUTYLENE

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon monoxide

11. Toxicological Information

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No chronic effects data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Isobutylene	Isobutylene
HAZARD CLASS:	2.1	2.1
IDENTIFICATION NUMBER:	UN 1055	UN 1055
SHIPPING LABEL:	FLAMMABLE GAS	FLAMMABLE GAS

15. Regulatory Information

Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard

Fire Hazard

Sudden Release of Pressure Hazard

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

PRODUCT NAME: ISOBUTYLENE

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

Section 1: PRODUCT & COMPANY IDENTIFICATION

Product Name: Simple Green® All-Purpose Cleaner
Simple Green® Scrubbing Pad
Additional Name: Simple Green® Concentrated Cleaner/Degreaser/Deodorizer

Manufacturer's Product Code Numbers: *Please refer to page 4

Company: Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Harbour, CA 92649 USA

Telephone: 800-228-0709 • 562-795-6000 Fax: 562-592-3830

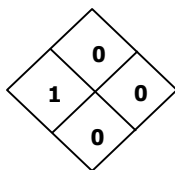
Emergency Phone: Chem-Tel 24-Hour Emergency Service: 800-255-3924

Use of Product: An all purpose cleaner and degreaser used diluted in water for direct, spray and dip tank procedures. Scrubbing pad is used with water for manual scrubbing applications. Both are for cleaning water-safe surfaces.

Section 2: HAZARDS IDENTIFICATION

Emergency Overview: CAUTION. Mild eye irritant.

Simple Green® is a dark green liquid with a sassafras odor. Scrubbing Pad is a green fibrous rectangle.



HMIS Rating:

Health = 1 = slight

Fire = 0

Reactivity, and Special = 0 = minimal

Eye Contact: Mild Eye Irritant.

Skin Contact: No adverse effects expected under typical use conditions. Prolonged exposure may cause dryness. Under this condition, use of gloves or skin moisturizer after washing may be indicated.

Ingestion: May cause stomach or intestinal upset if swallowed (due to deterative properties.)

Inhalation: No adverse effects expected under typical use conditions. Adequate ventilation should be present when using Simple Green® over a prolonged period of time. Open windows or ventilate via fan or other air-moving equipment if necessary.

Carcinogens: No ingredients are listed by OSHA, IARC, or NTP as known or suspected carcinogens.

Medical Conditions: No medical conditions are known to be aggravated by exposure to Simple Green®. Dermal-sensitive users may experience mild but reversible reactions.

UN Number: Not Required

Dangerous Goods Class: Non-hazardous

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

The only ingredient of Simple Green® with established exposure limits is undiluted 2-butoxyethanol (<4%) (Butyl Cellosolve; CAS No. 111-76-2) [*1% for Scrubbing Pad*]: the ACGIH TLV-TWA is 20 ppm (97 mg/m³). Based upon chemical analysis, Simple Green® contains no known EPA priority pollutants, heavy metals or chemicals listed under RCRA, CERCLA, or CWA. Analysis by TCLP (Toxicity Characteristic Leaching Procedure) according to RCRA revealed no toxic organic or inorganic constituents.

All components of Simple Green® are listed on the TSCA Chemical Substance Inventory. This product does not contain any ingredients covered by the provisions of 29 CFR 1910.1200.

Section 4: FIRST AID MEASURES

- Eye Contact:** Reddening may develop. Immediately rinse the eye with large quantities of cool water; continue 10-15 minutes or until the material has been removed; be sure to remove contact lenses, if present, and to lift upper and lower lids during rinsing. Get medical attention if irritation persists.
- Skin Contact:** Minimal effects, if any; rinse skin with water, rinse shoes and launder clothing before reuse. Reversible reddening may occur in some dermal-sensitive users; thoroughly rinse area and get medical attention if reaction persists.
- Swallowing:** Essentially non-toxic. Give several glasses of water to dilute; do not induce vomiting. If stomach upset occurs, consult physician.
- Inhalation:** Non-toxic. Exposure to concentrate may cause mild irritation of nasal passages or throat; remove to fresh air. Get medical attention if irritation persists.

Section 5: FIRE FIGHTING MEASURES

Simple Green® is stable, not flammable, and will not burn. No special procedures required.

Flash Point/Auto-Ignition: Not flammable.

Extinguishing Media: Not flammable/non-explosive.

Flammability Limits: Not flammable.

Special Fire Fighting Procedures: None required.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: Avoid contact with eyes. Do not rub eyes with hands during cleanup. No special precautions for dermal contact are needed. Wash hands thoroughly after cleaning up spill or leak.

Method for cleaning up: Recover usable material by convenient method, residual may be removed by wipe or wet mop. If necessary, unrecoverable material may be washed to drain with large quantities of water.

Section 7: HANDLING AND STORAGE

No Special precautions are required. **This product is non-hazardous for storage and transport according to the U.S. Department of Transportation Regulations.** Simple Green® requires no special labeling or placarding to meet U.S. Department of Transportation requirements.

UN Number: Not Required

Dangerous Goods Class: Non-hazardous

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

- Exposure Limits:** The Simple Green® formulation presents no health hazards to the user when used according to label directions for its intended purposes. Mild skin and eye irritation is possible (please see Eye contact and Skin contact in section IV.) No special precautionary measures required under normal use conditions.
- Ventilation:** No special ventilation, precautions or respiratory protection is required during normal use. Large-scale use indoors should provide an increased rate of air exchange.
- Human Health Effects or Risks From Exposure:** Adverse effects on human health are not expected from Simple Green®, based on 20 years of use of Simple Green® without reported adverse health incidence in diverse population groups, including extensive use by inmates of U.S. Federal prisons in cleaning operations.
- Eye protection:** Simple Green® is a mild eye irritant; mucous membranes may become irritated by concentrate. Eye protection not generally required. Wash hands after using wipes.
- Skin protection:** Simple Green® is not likely to irritate the skin in the majority of users. Repeated daily application to the skin without rinsing, or continuous contact on the skin may lead to temporary, but reversible, irritation. Rinse completely from skin after contact.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION – continued –

General hygiene conditions: There are no known hazards associated with this material when used as recommended. The following general hygiene considerations are recognized as common good industrial hygiene practices:

- Avoid breathing vapor or mist.
- Avoid contact with eyes.
- Wash thoroughly after handling and before eating, drinking, or smoking.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Cleaner is a dark green liquid, pad is a fibrous green matrix; both exhibit a sassafras odor.			
Specific Gravity:	1.010 ± 0.010	Vapor Pressure:	18 mm Hg @ 20°C; 23.5 mmHg @ 26°C
Evaporation:	>1 (butyl acetate = 1)	Vapor Density:	1.3 (air = 1)
Water Solubility:	100%	Density:	8.5 lbs/gallon
Boiling Point:	100.6°C (212°F)	pH:	9.5 ± 0.3
Ash Content:	At 600°F: 1.86% by weight	Nutrient Content:	
Freezing Point:	Approx -9 °C (16 °F) <i>If product freezes, it will reconstitute without loss of efficacy when brought back to room temperature and agitated.</i>	Phosphorus: 0.3% by formula Nitrogen <1.0% by weight (fusion and qualitative test for ammonia) Sulfur: 0.6% by weight (barium chloride precipitation method)	
VOC Composite Partial Pressure: 0.006 mmHg @ 20°C			
Volatile Organic Compounds (VOCs): Cleaner meets CARB & BAAQMD regulations. Cleaner must be diluted 1:1 with water to Meet SCAQMD Rule 1171 & Rule 1122 VOC requirements for solvent cleaning operations. [<i>Scrubber VOCs = 3.3% prior to dilution w/water</i>]			
CARB Method 310	3.8%		
SCAQMD Method 313	2.8%		

Section 10: STABILITY AND REACTIVITY

Stability: Stable
 Materials to Avoid: None known
 Hazardous Decomposition Products: None expected

Section 11: TOXICOLOGICAL INFORMATION

Toxicology information is based on chemical profile of ingredients and extrapolation of data from similar formulas.

Acute Toxicity: Oral LD₅₀ (rat) >5 g/kg body weight* *Calculation from OECD series on testing and assessment number 33, Chapter 3.2
 Dermal LD₅₀ (rabbit) >2 g/kg body weight

Eye Irritation: Moderate/Mild reversible eye irritation may occur based on relevant laboratory studies. This potential is reduced by immediate rinsing of eyes in case of eye contact.

Dermal Irritation: Mild, reversible skin irritation may occur based on relevant laboratory studies. A 6-hour exposure to human skin under a patch did not produce irritation

Repeat Exposure Via Skin Contact: Based on relevant laboratory studies, no toxic effects are expected to be associated with daily skin exposures (with up to 2 g/kg/day tested for 13 weeks on rabbits). Skin irritation may, however, occur with repeated or prolonged exposures.

Reproductive Effects Assessment: Based on relevant laboratory studies (CD-1 mouse 18-week fertility assessment continuous breeding), no adverse effects on reproduction, fertility, or health of offspring are expected.

Section 12: ECOLOGICAL INFORMATION

Hazard to wild animals & aquatic organisms: Low, based on toxicological profile.

Biodegradability: Readily biodegradable based on biodegradation profile, PRO/FT CBT-AC 014-7 “Ready Biodegradability: Closed Bottle Test” OECD, and OECD 302B laboratory tests

Environmental Toxicity Information: It is important not to allow the runoff from cleaning into closed systems such as decorative ponds. Always protect closed systems with tarps or dikes if necessary.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable local, state and federal laws. Dispose of used or unused product, and empty containers in accordance with the local, State, Provincial, and Federal regulations for your location. Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

This product is non-hazardous for transport according to the U.S. Department of Transportation Services

UN Number: Not required

Dangerous Goods Class: Non-hazardous

Section 15: REGULATORY INFORMATION

*Reportable components:

All components are listed on: EINECS and TSCA Inventory

No components listed under: Clean Air Act Section 112

SARA: This material contains 2-Butoxyethanol, < 4%, (CAS# 111-76-2) which is subject to the reporting requirements of Section 313 of SARA Title III and 49 CFR Part 373.

RCRA Status: Not a hazardous waste.

CERCLA Status: No components listed

TSCA TRI Reporting: Not required / Not listed

CA PROP. 65 Status: No components listed

Section 16: OTHER INFORMATION

Questions about the information found on this MSDS should be directed to:
SUNSHINE MAKERS, INC. – TECHNICAL DEPARTMENT
15922 Pacific Coast Hwy. Huntington Harbour, CA 92649

Phone: 800/228-0709 [8am-5pm Pacific time, Mon-Fri]

Fax: 562/592-3830

Email: infoweb@simplegreen.com

CAGE CODE 1Z575

GSA/FSS - CONTRACT NO. GS-07F-0065J

National Stock Numbers & Industrial Part Numbers:

Simple Green	Part Number	NSN	Size
	13012	7930-01-342-5315	24 oz spray (12/case)
	13005	7930-01-306-8369	1 Gallon (6/case)
	13006	7930-01-342-5316	5 Gallon
	13016	7930-01-342-5317	15 Gallon
	13008	7930-01-342-4145	55 Gallon
Scrubbing Pad	Part Number	NSN	Size
	10224	7930-01-346-9148	Each (24/case)

Retail Numbers:

Part Number	Size
13002	16 oz Trigger (12/case)
13005	1 Gallon (6/case)
13013	24 oz Trigger (12/case)
13014	67 oz / 2 L (6/case)
13033	32 oz Trigger (12/case)

* part number is for both industrial and retail

**International Part Numbers May Differ.

DISCLAIMER: The information provided with this MSDS is furnished in good faith and without warranty of any kind. Personnel handling this material must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of this material and the safety and health of employees and customers. Sunshine Makers, Inc. assumes no additional liability or responsibility resulting from the use of, or reliance on this information.

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 <ul style="list-style-type: none"> • 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.

Footnotes:

- 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	<ul style="list-style-type: none"> • Body Temp 98 to 90°F • Shivering • Lack of coordination, stumbling, fumbling hands • Slurred speech • Memory loss • Pale, cold skin 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Body temp 90 to 86°F • Shivering stops • Unable to walk or stand • Confused and/or irrational 	<ul style="list-style-type: none"> • All of the above, plus: <ul style="list-style-type: none"> ○ Call 911 ○ Cover all extremities completely ○ Place very warm objects, such as hot packs on the victim's head, neck, chest, and groin
Severe Hypothermia	<ul style="list-style-type: none"> • Body temp 86 to 78°F • Severe muscle stiffness • Very sleepy or unconscious • Ice cold skin • Death 	<ul style="list-style-type: none"> • Call 911 • Treat victim very gently • Do not attempt to re-warm
Frostbite	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Call 911 • Do not rub the area • Wrap in soft cloth • If help is delayed, immerse in warm (not hot) water
Trench Foot	<ul style="list-style-type: none"> • Tingling, itching, or burning sensation • Blisters 	<ul style="list-style-type: none"> • Soak feet in warm water, then wrap with dry cloth bandages • Drink a warm (not hot) sugary drink

Appendix D

Forms



Accident/Incident Report Form

Please complete this form and send it to your Branch Manager, HR and CHSO **within 24 hours** of the incident.

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
<input type="checkbox"/> Personal Injury/Illness <input type="checkbox"/> Vehicle Accident <input type="checkbox"/> Property Damage <input type="checkbox"/> Environmental Spill <input type="checkbox"/> 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)



Accident/Incident Report Form

Please complete this form and send it to your Branch Manager, HR and CHSO **within 24 hours** of the incident.

SECTION C AUTO ACCIDENT ONLY

DRIVER/VEHICLE INFORMATION

Name of Insured: _____	Name of Other Driver: _____
Department: _____	Driver's License Number: _____
Driver's License Number: _____	State: _____
DOB: ____/____/____ State: _____	Description of Vehicle: License Plate Number: _____
Description of Vehicle: License Plate Number: _____	Make: _____ Model: _____ Year: _____ Color: _____
Make: _____ Model: _____ Year: _____ Color: _____	Insurance Carrier: _____
Owner: _____	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 INVESTIGATION

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: _____



Utility Clearance Documentation

Project: _____

Site: _____

Drilling Location ID: _____

Driller: _____

GEI PM: _____

GEI Field Team Leader: _____

Utility Drawings Reviewed: _____

Provided By: _____

Reviewed By: _____

One Call Utility Clearance Call Date: _____

Utility Clearance Received back from (list utilities): _____

Completed By (Company): _____ Date: _____

GEI Staff Responsible for Oversight: _____

Metal Detector Survey (yes/no): _____

Drilling Location Cleared by: _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Physical Test Pit Clearance Required (yes/no): _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Handclearing Performed: _____ Date: _____

Contractor: _____

GEI Staff Responsible for Oversight: _____

Notes: _____

Based upon the best available information, appropriate utility clearance procedures were performed for the invasive work specified. If client ordered/site specific deviations from existing GEI utility clearance procedures exist, they are approved by the client signature below.

Client Signature (Optional): _____ Date: _____

GEI, Inc. Representative: _____ Date: _____

Appendix E

GEI's Health and Safety SOPs

STANDARD OPERATING PROCEDURES

SOP No. HS-001 Biological Hazards

1.1 Objective

The objective of this standard operating procedure (SOP) is to prevent or limit the potential for GEI personnel to encounter biological hazards during field activities.

1.2 General

This SOP is intended for use by employees engaged in work with the potential for contact with biological hazards such as animals, insects, plants, and sewage. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the potential for encounters with biological hazards and the control methods to be implemented 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.

1.2.1 Animals

During some site operations, animals such as stray or domesticated dogs or cats, raccoons, snakes, bears, rats, bats, etc. may be encountered. Employees should use discretion and attempt to avoid contact with animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting a licensed animal control technician.

1.2.1.1 Rabies

The rabies virus is transmitted through the bite of an infected animal or contact with saliva or brain/nervous system tissue of an infected animal. The rabies virus infects the central nervous system causing disease in the brain. The early symptoms of rabies in people are fever, headache, and general weakness or discomfort. As the disease progresses, more specific symptoms appear and may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation (increase in saliva), difficulty swallowing, and hydrophobia (fear of water). Death usually occurs within days of the onset of these symptoms.

If you are bitten or think you may be exposed, wash any wounds immediately and thoroughly with soap and water. Then notify the Project Manager and Corporate Health and Safety Officer (CHSO) and go to the hospital emergency room. The doctor, possibly in consultation with the state or local health department, will decide if you need a rabies vaccination. Decisions to start vaccination will be based on your type of exposure and the animal you were exposed to, as well as laboratory and surveillance information for the

geographic area where the exposure occurred. An Accident Report Form should be completed and submitted per GEI's accident reporting procedures.

1.2.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, ticks, spiders, etc may be present at a job site making the chance of a bite/sting possible. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. Some insect bites can transmit diseases such as Lyme disease or a virus such as West Nile. The following is a list of preventive measures:

- Apply insect repellent prior to performing field work and as often as needed throughout the work shift
- Wear proper protective clothing (work boots, socks and light colored clothing)
- Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for long periods of time, or when many insects are most active (between dawn and dusk).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible
- Field personnel who may have insect allergies should have bee sting allergy medication on site and should provide this information to the SSO and the CHSO prior to commencing work.
- Field personnel should perform a self-check at the end of the day for ticks.

1.2.3 Tick-borne Diseases

Lyme disease is caused by infection from a deer tick that carries a spirochete. During the painless tick bite, the spirochete may be transmitted into the bloodstream often after feeding on the host for 12 to 24 hours. The ticks that cause the disease are often no bigger than a poppy seed or a comma in newsprint. The peak months for human infection are from May to September.

Symptoms appear in three stages. First symptoms usually appear from 2 days to a few weeks after a person is bitten by an infected tick. Symptoms usually consist of a ring-like red rash on the skin where the tick was attached. The rash is often bulls-eye like with red around the edges and clear in the center. The rash may be warm, itchy, tender, and/or "doughy." Unfortunately, this rash appears in only 60 to 80% of infected persons. An infected person also has flu-like symptoms of a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. These symptoms often disappear after a few weeks.

The second stage symptoms, which occur weeks to months later include meningitis, severe headache, drooping of the muscles on the face, called Bell's Palsy, encephalitis, numbness, withdrawal and lethargy. These symptoms may last for several weeks to several months. Third stage symptoms, which occur months or years later include arthritis, heart problems, and loss of memory. The third stage symptoms may mimic multiple sclerosis and Alzheimer's disease.

Personnel should check themselves when in areas that could harbor deer ticks, wear light color clothing and visually check themselves and their buddy when coming from wooded or vegetated areas. If a GEI employee has been bitten by a tick, the CHSO should be contacted immediately. An Accident Report form must be completed by the individual in compliance with the Accident Reporting procedure outlined in the Corporate Health and Safety Manual.



From left to right: The deer tick adult female, adult male, nymph, and larva on a centimeter scale.

The tick can be removed by pulling gently at the head with tweezers. If tweezers are not available, cover your fingers with tissue paper and use them to grasp the tick. It is important to grasp the tick as close to the site of attachment and use a firm steady pull to remove it. Wash hands immediately after with soap and water. The affected area should then be disinfected with an antiseptic wipe. All mouth parts must be removed from the skin. If the tick is removed by breaking off the mouth parts, an irritation or infection may occur. Also, the organism that is causing the disease can still enter the body through the skin. The employee will be offered the option for medical treatment by a physician, which typically involves antibiotics. If personnel feel sick or have signs similar to those above, they should notify the SSO and the CHSO immediately.

Treatment with antibiotics is effective and recovery is usually complete. In the first stage antibiotics are usually given orally. Second and third stage treatment, however is prolonged and recovery may take longer. Antibiotic treatment is usually provided intravenously for second and third stage Lyme disease.

The deer tick can also cause **Babesiosis**, an infection of the parasite *Babesia Microti*. Symptoms of Babesiosis may not be evident, but may also include fever, fatigue and

hemolytic anemia lasting from several days to several months. Babesiosis is most commonly diagnosed in the elderly or in individuals whose immune systems are compromised.

Ehrlichiosis is a tick-borne disease which can be caused by either of two different organisms. Human monocytic ehrlichiosis (HME) is caused by *Ehrlichia chaffeensis*, which is transmitted by the lone star tick (*Amblyomma americanum*). Human granulocytic anaplasmosis (HGA), previously known as human granulocytic ehrlichiosis (HGE), is caused by *Anaplasma phagocytophilia*, which is transmitted by the deer tick (*Ixodes scapularis*).

In New York State, most cases of ehrlichiosis have been reported on Long Island and in the Hudson Valley. Ehrlichiosis is transmitted by the bite of infected ticks, including the deer tick and the lone star tick. The symptoms of HME and HGE are the same and usually include fever, muscle aches, weakness and headache. Patients may also experience confusion, nausea, vomiting and joint pain. Unlike Lyme disease or Rocky Mountain spotted fever, a rash is not common. Infection usually produces mild to moderately severe illness, with high fever and headache, but may occasionally be life-threatening or even fatal. Symptoms appear one to three weeks after the bite of an infected tick. However, not every exposure results in infection.

Rocky Mountain spotted fever (RMSF) is a tick-borne disease caused by a rickettsia (a microbe that differs somewhat from bacteria and virus). Fewer than 50 cases are reported annually in New York State. In the eastern United States, children are infected most frequently, while in the western United States, disease incidence is highest among adult males. Disease incidence is directly related to exposure to tick-infested habitats or to infested pets. Most of the cases in New York State have occurred on Long Island. RMSF is characterized by a sudden onset of moderate to high fever (which can last for two or three weeks), severe headache, fatigue, deep muscle pain, chills and rash. The rash begins on the legs or arms, may include the soles of the feet or palms of the hands and may spread rapidly to the trunk or rest of the body. Symptoms usually appear within two weeks of the bite of an infected tick.

*(Information on Ehrlichiosis, Babesiosis, and Rocky Mountain Spotted Fever was derived from the New York State Department of Health).

1.2.4 West Nile Virus

West Nile Virus (WNV) is a mosquito-borne infection transmitted through the bite of an infected mosquito. The symptoms of WNV can be asymptomatic (no symptoms) or in more serious cases can lead to West Nile Fever. West Nile Fever can include fever, headache, tiredness, body ache, an occasional rash on the trunk of the body, and swollen

lymph glands, In severe cases, people have developed West Nile Encephalitis or Meningitis which symptoms include fever, headache, neck stiffness, tremors, coma and in some cases death. The incubation period for the disease is usually 2 to 15 days. The symptoms can range from a few days to several weeks. Most mosquitoes are not infected and the chance of infection from a mosquito bite of an on-site worker is very small.

The following precautions will be used to help reduce the risk of mosquito bites:

- Reduce mosquito-breeding areas by making sure wheelbarrows, buckets, and other containers are turned upside down when not used so that they do not collect standing water.
- Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for long periods of time, or when many mosquitoes are most active (between dawn and dusk).
- Use mosquito repellent according to the manufacturer's directions when outdoors for long periods of time and when mosquitoes are most active.

Centers for Disease Control and Prevention (CDC) evaluation of information contained in peer-reviewed scientific literature and data available from the Environmental Protection Agency (EPA) has identified several EPA registered products that provide repellent activity sufficient to help people avoid the bites of disease carrying mosquitoes. Products containing these active ingredients typically provide reasonably long-lasting protection:

- **DEET** (Chemical Name: N,N-diethyl-m-toluamide or N,N-diethyl-3-methylbenzamide) 20 to 30 percent DEET
- **Picaridin** (KBR 3023, Chemical Name: 2-(2-hydroxyethyl)-1-piperidinecarboxylic acid 1-methylpropyl ester)
- **Oil of Lemon Eucalyptus** or **PMD** (Chemical Name: para-Menthane-3,8-diol) the synthesized version of oil of lemon eucalyptus
- **IR3535** (Chemical Name: 3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester)
- **Permethrin** (3-Phenoxybenzyl (1RS)-cis,trans-3-(2,2-dichlorovinyl) -2,2-dimethylcyclopropanecarboxylate) - Permethrin kills ticks and can be used on clothing (but not skin)

EPA characterizes the active ingredients DEET and Picaridin as “conventional repellents” and Oil of Lemon Eucalyptus, PMD, and IR3535 as “biopesticide repellents”, which are derived from natural materials.

In general, higher concentrations of active ingredient provide longer duration of protection, regardless of the active ingredient, although concentrations above approximately 50% do not offer a marked increase in protection time. Products with less than 10% active ingredient may offer only limited protection, often from 1 to 2 hours. Products that offer sustained release or controlled release (micro-encapsulated) formulations, even with lower active ingredient concentrations, may provide longer protection times. Regardless of what product you use, if you start to get mosquito bites reapply the repellent according to the label instructions or remove yourself from the area with biting insects if possible.

Clothing and other products can be purchased pre-treated, or products can be treated using EPA-registered products. Permethrin is the only pesticide approved by the EPA for these uses. Permethrin binds tightly to the fabrics, resulting in little loss during washing and minimal transfer to the skin. Permethrin is poorly absorbed through the skin, although sunscreens and other products may increase the rate of skin absorption.

If you decide to use permethrin-treated clothing, consider these tips:

- Read the application instructions carefully and apply the product according to the label directions. Do not over-treat products.
- Permethrin treatments are only intended for use on fabrics; do not apply them directly to the skin or other items.
- Do not apply permethrin to clothing while it is being worn.
- Apply the products outdoors in well ventilated areas that are protected from wind.
- Hang treated fabrics outdoors and allow them to dry completely before wearing them.
- Wash permethrin treated clothing separately from other clothing items.

1.2.5 Plants

The potential for contact with poisonous plants, such as poison ivy, sumac, and oak, exists when performing fieldwork in wooded or boggy areas. These plants can cause allergic reaction when in contact with the leaves or vines.

Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison ivy grows throughout much of North America, including all states east of the Rocky Mountains. It is normally found in wooded areas, especially along edge areas where the tree line breaks and allows sunshine to filter through. It also grows in exposed rocky areas, open fields and disturbed areas.

Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety "down." Poison sumac has white, "hairy" berry clusters. Poison sumac grows exclusively in very wet or flooded soils, usually in swamps and peat bogs, in the eastern United States.

Poison oak can be present as a sparingly branched shrub. Poison oak can grow anywhere in the United States with the exception of Hawaii, Alaska, and some southwest areas that have desert climates. Poison oak is similar to poison ivy in that it has the same leaflet configuration; however, the leaves have slightly deeper notches.

Keep in mind that for each of these plants,



Poison Oak



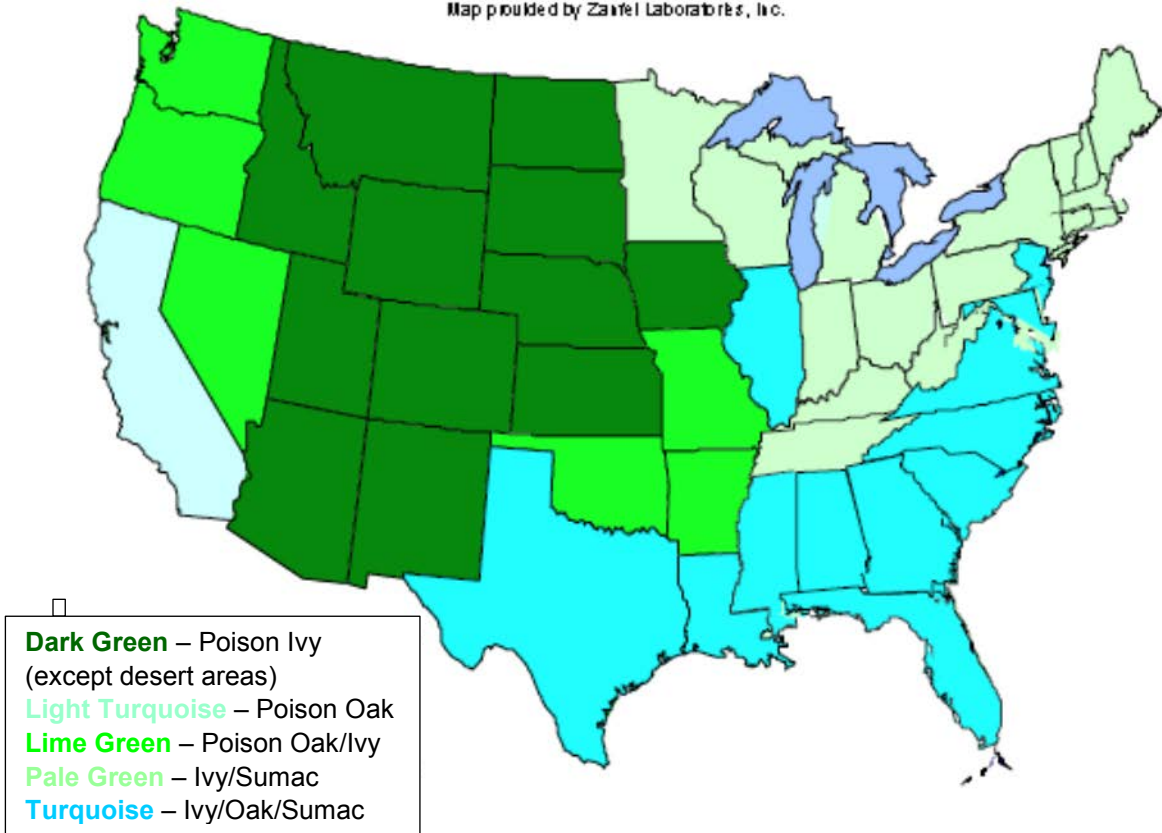
Poison Ivy



Poison Sumac

U.S. Prevalence of Poison Ivy, Oak & Sumac

Map provided by Zante Laboratories, Inc.



Source: United States Department of Agriculture Plant Database, <http://plants.usda.gov/>

To prevent exposure to these poisonous plants:

- Barrier skin creams, such as lotion containing bentoquatam (Tecnu®), may offer some protection prevent the occurrence of exposure symptoms.
- Wear long sleeves, long pants, boots, and gloves.

Contact with poison ivy, sumac, or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin which needs first aid treatment. Susceptible individuals should identify themselves to the SSO or GEI Project Manager. If you believe you have contacted one of these plants:

- Immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.
- 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. Urushiol can remain active on the surface of objects for up to 5 years.

- If a rash occurs, contact the CHSO and complete and submit an Accident Report Form.

1.2.6 Sewage and Bacterial Impacted Sediments

Some project work may be conducted at sites that serve or have served as a combined sewer overflow (CSO) and consequently may have received untreated sanitary sewage from numerous sources. Decomposed sewage can potentially be encountered within sites and their sediments. Sediments could contain soil and marine microorganisms, and bacterium associated with sewage. Many of these bacterium can cause illness through ingestion, direct contact, or the inhalation of a bio-aerosol. Potential respiratory exposure to biological agents can also occur through the inhalation of aerosols produced during sediment handling activities. Personal protective equipment as identified in the site-specific HASP will be worn to minimize potential exposures. Employees will follow the decontamination or disposal procedures identified in the HASP.

1.3 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.4 References

<http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm

<http://www.epa.gov/pesticides/health/mosquitoes/insectrp.htm>

<http://www.cdc.gov/niosh/topics/lyme/>

Protecting Yourself From Ticks and Mosquitoes, NIOSH Fast Facts, Publication No. 2010-119

<http://npic.orst.edu/pest/mosquito/ptc.html>

1.5 Attachments

None

1.6 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-002 Infectious Materials and Bloodborne Pathogens Exposure Control Plan

1.1 Objective

GEI personnel may come into contact with potentially infectious agents when rendering first aid or CPR. Employees may also come into contact with these materials when working at certain contaminated sites (i.e., urban sites or sewer outfall exposures). This SOP has been developed to minimize the potential for exposure to employees who may contact, directly or indirectly, infectious agents.

1.2 General

- Potential exposures will be reported to the Project Manager and/or Corporate Health and Safety Officer (CHSO). Determination of actual exposure will be made by a physician in coordination with AllOne Health.
- Employees who may potentially be exposed to known infectious materials and/or bloodborne pathogens will be notified of the hazards in a pre-entry briefing.
- Universal Precautions (i.e., treat all potentially infectious materials as if it were infected) will be used at all times.

1.3 Policy

1.3.1 Standard Procedures

All sampling of potentially infectious materials will be performed in a manner that minimizes the potential for creating splashes, droplets, or aerosols. Mechanical pipetting devices will be used for manipulating all sanitary sewer effluent. Mouth pipetting is prohibited.

The use of glassware or equipment with sharp or pointed edges will be kept at a minimum to reduce the potential of injury that would create a direct route of entry into the body for any infectious materials.

All minor cuts, scratches, or other breaks in the skin barrier will be covered prior to the handling of infectious materials. Employees experiencing exudative lesions or weeping dermatitis will refrain from direct contact with infectious materials.

Eating, drinking, smoking, or application of cosmetics is not permitted in areas where potentially infectious materials are handled or sampled.

Employees will wash and disinfect their hands, face, or any other potentially contaminated skin surfaces upon completing the handling of infectious or potentially infectious agents or after rendering first aid.

1.3.2 Personal Protective Equipment (PPE)

PPE will be worn to reduce the potential of exposures to splashes or aerosols. At a minimum, this equipment will include safety glasses and appropriate gloves, but may also require the use of face, respiratory, foot, and full-body protection. Refer to the site-specific Health and Safety Plan for specific PPE requirements.

Gloves used in the handling or sampling of infectious materials will be appropriately disposed of and not reused.

1.3.3 Medical Monitoring

Medical monitoring is required for an employee when a potential workplace exposure has occurred. The employee must notify the CHSO and Human Resources regarding the potential exposure as soon as possible. For infectious agents in which a medically accepted vaccination has been developed (e.g., HBV) potentially exposed employees will be given the option to receive an inoculation at no cost. Employees who have been exposed will be given the option to receive a confidential medical evaluation at no cost. All required records for exposed employees will be kept confidential.

1.3.4 Training

All employees with a reasonable risk for exposure must attend Bloodborne Pathogen training covering the following topics:

- An explanation of the OSHA bloodborne pathogen standard.
- A general explanation of bloodborne diseases.
- An explanation of the modes of transmission of bloodborne diseases.
- An explanation of the Exposure Control Plan.
- Appropriate methods for recognizing tasks that involve potential exposure.
- An explanation of the use and limitations of methods to prevent exposure.
- Proper types, use, handling, decontamination, and disposal of PPE.
- The availability of HBV vaccines and the procedures for obtaining a vaccination.
- Appropriate actions to take during an emergency involving bloodborne pathogens.
- Post-exposure procedures.

- An explanation of required signs and labels.

1.4 Reference

OSHA 29 CFR 1910.1030 - Bloodborne Pathogens.

1.5 Contact

GEI Corporate Health and Safety Officer
Atlantic Regional Health and Safety Officer
New England Regional Health and Safety Officer
Midwest Regional Health and Safety Officer
Western Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURES

SOP NO. HS-003 Container Management

1.1 Objective

This SOP has been developed to minimize the potential for injuries to GEI employees performing container and drum handling and sampling, through proper use of engineering and administrative controls and education.

1.2 General

Hazardous substances and contaminated liquids and other residues will be handled, transported, labeled, and disposed of in accordance with this paragraph. Drums and containers will meet the appropriate DOT, OSHA, and EPA regulations for the wastes that they contain.

Site operations will be organized to minimize the amount of drum or container movement. Prior to movement of drums or containers, all employees exposed to the transfer operation will be notified of the potential hazards associated with the contents of the drums or containers. Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

U.S. Department of Transportation specified salvage drums or containers and suitable quantities of proper absorbent will be kept available and used in areas where spills, leaks, or ruptures may occur. Where spills may occur, a spill containment program, which may be part of the health and safety plan, will be implemented to contain and isolate the entire volume of the hazardous substance being transferred. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, will be on hand and ready for use to control incipient fires.

1.3 Opening Drums and Containers

The following procedures will be followed in areas where drums or containers are being opened:

- Employees not actually involved in opening drums or containers will be kept a safe distance from the drums or containers being opened.
- If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation will be placed between the employee and the drums or containers being opened to protect the employee in case of accidental release.

- GEI employees will not handle or attempt to open bulging containers. Employees will not stand upon or work from drums or containers. GEI will contract with a hazardous waste company to handle, manage, and dispose of a bulging drum.

1.4 Material Handling Equipment

Material handling equipment used to transfer drums and containers will be selected, positioned, and operated to minimize sources of ignition.

1.5 Radioactive Wastes

GEI does not routinely handle or manage radioactive waste. If required to do so for a project, procedures will be approved by the Corporate Health and Safety Officer (CHSO) and Regional Health and Safety Officer (RHSO).

1.6 Shock-sensitive Wastes

GEI employees will not handle shock-sensitive waste. Shock-sensitive waste or chemicals may explode with friction, movement or heat. Some chemicals are shock-sensitive by nature, others become shock-sensitive through drying, decomposition, or slow reactions with oxygen, nitrogen, or the container. Some chemicals that are, or can, become shock-sensitive will have that hazard noted in the MSDS.

- Drums and containers containing packaged laboratory wastes will be considered to contain shock-sensitive or explosive materials until they have been characterized. *Caution: Shipping of shock-sensitive wastes may be prohibited under U.S. Department of Transportation regulations. Shippers will refer to 49 CFR 173.21 and 173.50.*

1.7 Laboratory Waste Packs

GEI employees will not handle or open laboratory waste packs.

1.8 Sampling of Drum and Container Contents

Sampling of containers and drums will be done in accordance with a site-specific sampling plan that will be developed in conjunction with a site-specific health and safety plan.

1.9 Shipping and Transport

Drums and containers will be identified and classified prior to packaging for shipment. Drum or container staging areas will be kept to a minimum number as approved by the client to safely identify and classify materials and prepare them for transport. Staging areas will be provided with adequate access and egress routes. Bulking of hazardous

wastes will be permitted only after a thorough characterization of the materials has been completed and approved by the Client.

1.10 Tank and Vault Procedures

GEI employees do not routinely sample vaults and tanks. Entry procedures will be coordinated and approved by the CHSO and RHSO.

1.11 Limitations

None

1.12 References

OSHA 1910.120 Hazardous Waste Operations and Emergency Response (j) Handling of Drums and Containers.

1.13 Attachments

GEI – Weekly Facility/Hazardous Waste Inspection Checklist.

1.14 Contact

GEI Corporate Health and Safety Officer
GEI Mid-West Regional Health and Safety Officer
GEI Atlantic Regional Health and Safety Officer
GEI New England Regional Health and Safety Officer
GEI Western Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURES

SOP No. HS-006 Excavations and Trenches

1.1 Objective

The objective of this Standard Operating Procedure (SOP) is to highlight the hazards and safety procedures when work activities include excavations and/or trenches. The following guidelines will be followed when excavations or trenches are present on GEI projects.

1.2 General

This SOP is intended for use by employees engaged in work on project sites that include trenching and/or excavation operations. The site-specific health and safety plan (HASP) must include a hazard assessment for the project that identifies the potential for trenching and excavation hazards and the control methods to be implemented by GEI employees. These hazards must be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

An “excavation” is any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

A “trench” (trench excavation) is a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.

Do not enter a trench or excavation without consulting with the Project Manager, Corporate Health and Safety Officer (CHSO), or Regional Health and Safety Officer (RHSO).

1.2.1 Personal Protective Equipment

Employees will be provided with the personal protective equipment (PPE) necessary to help protect them from the hazards of work activities related to excavations and/or trenches. All employees will wear a hard hat, steel toe or composite toe boots, and safety glasses at a minimum. In addition, face shields, gloves, fall protection and hearing protection may be required. PPE must be maintained in good condition, kept clean and properly stored when not in use. More information regarding PPE is located in Section 6 of GEI’s Corporate Health and Safety Program.

1.3 Hazards

Hazards associated with excavations and trenches can include collapse, falls, falling objects, hazardous atmospheres, and incidents involving mobile equipment. One cubic yard of soil can weigh as much as a car.

1.4 Entry

GEI employees will not enter trenches or excavations that do not comply with OSHA 29 CFR 1926.650. If a project requires GEI employees to enter a trench or excavation, the trench or excavation must meet the following requirements described in the following sections.

Do not enter a trench or excavation without consulting with the Project Manager, Corporate Health and Safety Officer (CHSO), or Regional Health and Safety Officer (RHSO).

1.4.1 *Competent Person*

The excavation must be inspected prior to the start of each shift by a competent person who most likely will work for the contractor performing the work. The competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions. GEI generally does not act as the competent person.

1.4.2 *Soil Type*

The competent person for the project will determine what the soil type is and what type of protective system will be implemented. The type of soil where the excavation or trench is being dug has significant influence on what type of protective system will need to be in place. There are four types of soil: stable rock, type A, type B, and type C. As you progress from stable rock to type C, the cohesive properties of the soil change the soil becomes less stable.

1.4.3 *Protective System*

A protective system is required for trenches or excavations greater than 5 feet in depth unless the excavation is made entirely in stable rock. In special situations the competent person may require a protection system for an excavation that is less than 5 feet deep. The competent person is responsible for assessing the soil type and the protective systems required for a specific trench when an excavation is less than 20 feet deep. If the excavation is greater than 20 feet in depth, the protection system requires a design by a registered professional engineer or based on tabulated data prepared and/or approved by a registered professional engineer.

The protective system will be designed based on soil type, depth of excavation, water level, loads adjacent to the excavation, changes in weather conditions, or other operations in the area. Protective systems can include sloping or benching of the sidewalls, shoring the sidewalls using an approved support system, or shielding workers with a trench box or other similar type of support.

The different types of protective systems include:

Benching is a method of protecting workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels of steps, usually with vertical or near vertical surfaces between levels. Benching cannot be done with Type C soil.

Sloping involves cutting back the trench wall at an angle inclined away from the excavation.

Shoring requires installing aluminum hydraulic or other types of support structures to prevent soil movement and cave-ins.

Shielding protects workers by using trench boxes or other types of supports to prevent soil cave-ins.

Designing a protective system can be complex because many factors must be considered: soil classification, depth of cut, water content of soil, changes caused by weather or climate, surcharge loads (e.g., spoil, other materials to be used in the trench) and other operations in the vicinity.

1.4.4 Access and Egress

Excavations and trenches greater than 4 feet in depth require a safe access and egress including ladders, steps, or ramps. These points of access and egress are to be no greater than 25 feet of lateral travel in any direction.

1.4.5 Atmospheric Hazards

Where oxygen deficiency (atmospheres containing less than 20.7% oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation will be tested before employees enter excavation.

1.5 Subcontractor Oversight

When GEI is overseeing excavation activities performed by a subcontractor, the following safety hazards should be monitored:

- Care must be taken not to create new hazards like narrow walkways along edges of an excavation.
- Heavy equipment must not be parked or working at the edge of the excavation.
- Spoils should not be stockpiled within 2 feet of the trench edges.
- Confirm with subcontractor that underground utilities have been located before any excavation or trenching activities begin (*refer to SOP HS-014 Utility Mark-out*).
- Confirm with the subcontractor that the excavation or trench has been tested for hazardous atmospheres before entering.
- Confirm with the subcontractor that the excavation or trench has been inspected by a competent person before each work shift and after any type of precipitation. If hazards are identified during this inspection, verify that the hazards are controlled prior to entering the trench or excavation.
- GEI employees will not work under raised or suspended loads.
- Excavations/trenches must be protected at the end of a work shift if they are to be left open. These trenches/excavations must be covered and a sign that reads “Hole” must be placed in a location that will notify anyone of the hazard. Or a secure barricade will need to be installed.

In circumstances where GEI employees are working on sites where a contractual agreement with the excavation contractor does not exist and we cannot confirm the above stated conditions, entry into trenches or excavations will not be conducted. Any safety concerns that arise should be communicated to the Project Manager and, if necessary, the client.

1.6 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened.

The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.7 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

Some states, including Massachusetts, require a trench permit prior to trenching or excavation activities. Verification of local requirements will be evaluated in the planning stage.

1.8 References

OSHA 29 CFR 1926.650 – Subpart P; *Excavations*

OSHA Construction eTool – <http://www.osha.gov/SLTC/etools/construction/index.html>

OSHA FactSheet Trenching and Excavation Safety – viewed on 9/13/2016

https://www.osha.gov/OshDoc/data_Hurricane_Facts/trench_excavation_fs.pdf

1.9 Attachments

None

1.10 Contact

Health&SafetyTeam@geiconsultants.com

1.11 Review History

- September 2016
- May 2014
- November 2013
- January 2011
- Initial Version Date Unknown

STANDARD OPERATING PROCEDURES

HS-007 General Safety Requirements

1.1 General Health and Safety Training

GEI requires all employees to complete Health and Safety Training on an annual basis. Project employees must have completed, at a minimum, GEI's General 4-Hour Health and Safety Training or when required, HAZWOPER training before beginning any on-site work. In addition, all field staff must be current in First Aid and CPR Training. Further Health and Safety training requirements can be found in Section 2 of the GEI Health and Safety Manual. In addition, all site-specific safety training will be completed before beginning work on each project site.

1.2 Tailgate Meetings

Health and Safety tailgate meetings will be conducted by the GEI Project Manager or site safety officer (SSO), and be recorded in the GEI field book or in the GEI briefing log. All GEI staff on site will sign the meeting log to indicate attendance.

1.3 Health and Safety Plans (HASP)

GEI projects must have a HASP before beginning any work. GEI HASP templates are located on the Health and Safety page on the GEI intranet. Specific requirements for HASPs are located in Section 7 of GEI's Health and Safety Manual. After the HASP has been completed, it must be sent to the Corporate Health and Safety Officer (CHSO) and the Regional Health and Safety Officer (RHSO) for review. All project employees must read the HASP and sign the signature page to document that they have read, understood, and will comply with the requirements of the HASP. The site-specific HASP must be kept on-site at all times.

1.4 Personal Protective Equipment (PPE)

Project-specific PPE will be identified in the HASP based on the hazards present during work tasks. All required PPE must be worn on the project site. More information regarding PPE is located in Section 6 of GEI's Health and Safety Manual.

1.5 Fire Protection and Prevention

The work site should be kept clear of flammable materials and debris. GEI field personnel should know where all fire extinguishers are located, and be familiar in the use of the extinguisher. Information on the correct use of a fire extinguisher is included in

GEI's general health and safety training. Call 911(or other number identified in the project HASP) in the event of a fire.

1.6 Accident/Incident Reporting

The following accident reporting procedures must be followed:

- Seek medical attention.
- Notify your supervisor.
- Notify CHSO and Human Resources (HR) within two hours of the accident/incident.
- Complete Accident Reporting Form (found on the Health and Safety page of the GEI Intranet) within **24 hours** and send to CHSO and HR. Refer to Section 8 of the GEI Health and Safety Manual for more information.

1.7 Near Miss Reporting

GEI employees will complete a near-miss reporting form if a hazardous or unsafe condition or near miss is observed. The near-miss reporting form is located on the Health and Safety page of the GEI Intranet. Refer to Section 8 of the GEI Health and Safety Manual for more information.

1.8 Housekeeping

Work areas, passages, and stairs will be kept clear of debris. All debris will be removed from the project site at regular intervals.

1.9 Illumination

Project sites will be illuminated either with natural or artificial illumination, in compliance with OSHA regulations.

1.10 Sanitation

Hand-washing is an essential form of protection from chemical and biological exposures and illness. GEI employees should wash their hands after performing work tasks and regularly throughout the day. If soap and water are not available, hand sanitizers and/or wipes should be used.

1.11 Machinery, Tools, Material, and Equipment

Machinery, tools, material, and equipment will be kept in good repair and will be inspected by a competent person. Any unsafe equipment will be identified as unsafe by

tagging or locking the controls to render them inoperable or will be physically removed from the site.

1.12 Vehicles

GEI's motor vehicles will be in good working order. Brakes, tires, head lights, and tail lights will be inspected prior to initial use and regularly during extended use by the vehicle operator. If a need for repair is discovered, the operator should contact the branch manager or their designee responsible for the scheduling of such repair to make arrangements for the repair. Each GEI-owned vehicle will have a fire extinguisher and first aid kit. Additional fire extinguishers and first aid kits are kept in each GEI office for use in personal or rental vehicles.

1.13 Heavy Equipment

GEI employees will keep a line of sight between them and heavy equipment operators. If a GEI employee needs to communicate with heavy equipment operators, they will use hand signals or direct communication with the operator. GEI employees should never operate or climb on heavy equipment. GEI employees should not approach heavy equipment while it is in operation. GEI personnel should not use cellular telephones when working near operating equipment. For more information regarding heavy equipment, refer to GEI's Heavy Equipment SOP.

1.14 Contact

GEI Corporate Health and Safety Officer
GEI Mid-West Regional Health and Safety Officer
GEI Atlantic Regional Health and Safety Officer
GEI New England Regional Health and Safety Officer
GEI Western Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURES

SOP No. HS-008a Non-Powered Hand Tools

1.1 Objective

This Standard Operating Procedure (SOP) is intended for use by employees working with non-powered hand tools. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the hazards associated with the non-powered hand tools that will be used. These hazards should be reviewed during the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2 General

Misuse of hand tools accounts for the majority of accidents and injuries involving hand tools. Only use a tool for the task which it was designed for. If the right tool isn't available contact the Project Manager and discuss what is needed. Improper maintenance is another leading cause of injuries. Employees using hand tools may be exposed to a number of other potentially serious hazards: falling objects (i.e., objects can fall as a result of contact with tools or objects which are abrasive or splash), harmful dust, fumes mists, vapors, and gases, as well as contact with electrical power sources.

1.2.1 Condition of Tools

All hand tools, whether furnished by GEI or the employee, will be maintained in safe working condition. All hand tools must be inspected before use. Never use a tool if its handle has splinters, burrs, cracks, splits or if the head of the tool is loose. Never use impact tools such as hammers, chisels, punches or steel stakes having mushroomed (flattened) heads. Tag worn, damaged or defective tools "Out of Service" and do not use them; notify your Branch Manager or Project Manager so that the tool can be replaced or repaired. If the tools cannot be repaired they will be disposed of properly. GEI does not issue or permit the use of unsafe hand tools.

1.2.2 Personal Protective Equipment

Employees using hand tools will be provided with the personal protective equipment (PPE) necessary to protect them from the hazard of the tool as well as the associated hazards with using the tool. (i.e., projectile debris, dust, etc.). All employees will wear work gloves, steel toe or composite toe boots, and safety glasses at a minimum. In addition, face shields and hearing protection may be required. Most hand injuries can be avoided with the proper use of PPE. PPE must be maintained in good condition, kept clean and properly stored when not in use. More information regarding PPE is located in Section 6 of GEI's Corporate Health and Safety Program.

1.2.3 General Safe Practices

Never wear sandals, open-toed or canvas shoes when working with tools. Always tie back long hair. Avoid loose-fitting clothes which might become entangled in a tool. Always remove rings and other jewelry. Make sure your grip and footing are secure when using large tools. Never carry tools up ladders; use a tool belt, hoist, or a rope. Use extra caution when using tools at heights – a falling tool could kill a co-worker. Always pass a tool to another person by the handle – never toss it to them. Never use a tool with hands are wet, oily, or greasy. Select ergonomically-designed tools for work tasks when movements are repetitive and forceful. Always make sure observers are at a safe distance. Always secure work with a vice, clamp, or other support.

1.3 Non-Power Hand Tools

Non-powered hand tools include anything from axes to wrenches. Even though the tool is powered by human inertia, injuries from improper use of non-powered hand tools often involve severe disabilities.

1.3.1 Knives

Only use a knife with a sharpened blade. Pull the knife through the object and away from your body; pulling motions are easier to manage. Never use a knife if its handle has splinters, burrs, cracks, splits or if the blade is loose. Knives should never be used as screwdrivers, pry bars, or can openers. Never pick up knives by their blades. Always carry knives with their tips/points toward the floor. Never carry knives, scissors, or other sharp tools in pockets. Never attempt to catch a falling knife. When not in use, knives should be stored in sheaths. Box cutters will be self-retracting.

1.3.2 Wrenches

Never use wrenches that are bent, cracked, badly chipped, or having loose or broken handles. Discard any wrench with spread or battered jaws; if the handle is bent; or if a wrench has broken or battered points and notify your Branch Manager so that a replacement can be made. Never slip a pipe over a single head wrench handle to increase leverage. Never use a shim to make a wrench fit. Pull on a wrench using a slow, steady motion. Do not use push force on a wrench; you could lose your balance if the wrench slips.

1.3.3 Screwdrivers

Always match the size and type of screwdriver blade to fit the head of the screw. Do not hold the work piece against your body while using a screwdriver. Never put your fingers near the tip of a screwdriver when tightening a screw. Never use a screwdriver to make a starting hole for screws. Never use a screwdriver as a chisel, pry bar, or nail puller. When performing electrical work, always use an insulated screwdriver. Never use a screwdriver to test the charge of a battery.

1.3.4 Hammers

Never use a hammer if your hands are oily, greasy or wet. Always check behind you before swinging a hammer. Use a claw hammer for pulling nails. Never strike nails or other objects with the “cheek” of the hammer. Do not strike a hardened steel surface, such as a cold chisel, with a claw hammer. Never strike one hammer against another hammer. Never use a hammer as a wedge or a pry bar.

1.3.5 Pliers

Never use pliers which are cracked, broken, or sprung. Never use pliers as a wrench or a hammer. Do not attempt to force pliers by using a hammer on them. Never slip a pipe over the handles of pliers to increase leverage. When performing electrical work, always use insulated pliers. When using diagonal cutting pliers, shield loose pieces of cut material from flying into the air by using a cloth or your gloved hand.

1.3.6 Snips

Never use snips as a hammer, screwdriver, or pry bar. Always wear safety glasses or safety goggles when using snips to cut materials. Always wear work gloves when cutting materials with snips. Keep the blade aligned by tightening the nut and bolt of the snips. Never use straight cut snips to cut curves. Always use the locking clip on the snips when you have finished using them. Never leave or store snips in the open position.

1.3.7 Hand Saws

Always keep handsaws sharp and free of rust to prevent them from binding or jumping. Never carry a saw by the blade. Always hold the work piece firmly against a work table. Keep control of saws by releasing downward pressure at the end of the stroke. Never use an adjustable blade saw such as a hacksaw, coping saw, keyhole saw, or bow saw, if the blade is not taut. Oil saw blades after each use. Never force the saw through the cut as this may cause the saw to buckle or fly out of the groove and cause injury.

1.3.8 Chisels

Only use sharpened chisels. Never use chisels having mushroomed (flattened) striking heads. Whenever possible, hold a chisel by using a tool holder. Clamp small work pieces in a vise and chip towards the stationary jaw of the vise. Chip or cut away from yourself and keep both hands in back of the cutting edge. Always wear safety glasses or a face shield.

1.3.9 Vise and Clamps

Never use a vise having worn or broken jaw inserts, or having cracks or fractures in the body of the vise. Position the work piece in the vise so the entire face of the jaw supports the work piece. When clamping a long work piece in a vise, support the far end of the work piece by using an adjustable pipe stand or saw horse. Never slip a pipe over the handle of a vise to increase leverage. Never use a C-clamp for hoisting materials. Never use a C-clamp as a permanent fastening device.

1.3.10 Jacks

A manufacturer's rated capacity must be clearly marked on all jacks and all jacks must have a stop indicator. When using a jack, never exceed the capacity of the stop indicator. Jacks should be lubricated and inspected regularly. When setting up a jack, ensure the base is centered on a firm, level surface. The jack head should also be placed against a level surface. Lift force should be applied evenly. Put a block under the base of the jack when the foundation is not firm. If it seems likely the cap could slip, place a block between the jack cap and load. Immediately block the load after it is lifted.

1.4 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or supervisor/project manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.5 Limitations

Follow safety procedures as defined in the site-specific HASP or in the manufacturer's specifications. Appropriate PPE must be worn correctly to provide the intended level of protection. If a hand tool is being used that is not identified in this SOP consult the manufacturer's literature and contact the Safety Team so we can include the information in a future version of this SOP.

1.6 References

OSHA Standards for the Construction Industry, Subpart I
Risk Analytics, LLC Hand Tools Training, 2006

1.7 Attachments

None

1.8 Contact

Health&SafetyTeam@geiconsultants.com

1.9 Review History

- July 2016
- May 2014
- August 2011
- October 2010
- One revision date unable to be found

STANDARD OPERATING PROCEDURES

SOP No. HS-008b Powered Hand Tools

1.1 Objective

This Standard Operating Procedure (SOP) is intended for use by employees working with powered hand tools. The site-specific health and safety plan (HASP) should include a hazard assessment for the project that identifies the hazards associated with the powered hand tools that will be used. These hazards should be reviewed during the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.2 General

Misuse of hand tools accounts for the majority of accidents and injuries involving hand tools. Only operate power tools according to the manufacturer's instructions. Employees using power tools may be exposed to a number of potentially serious hazards including being hit by flying material from the work piece; hit by a flying part of a broken tool; explosion or fire resulting from sparks from a tool igniting combustible materials; electric shock from a broken tool, frayed or defective power cord, or improper grounding; exposure to harmful dust, fumes, mists, vapors, and gases. Hazards are usually caused by misuse, improper maintenance, improper or inefficient training, and complacency.

1.2.1 Condition of Tools

All hand tools, whether furnished by GEI or the employee, will be maintained in safe working condition with regular maintenance. Always inspect each tool, as well as power cords and attachments, for damage before use. Make sure the power is off and locked out before inspecting. Insure the tool guards are in place and functioning. Ensure that blades, bits, and other attachments are securely fastened. Tag worn, damaged, or defective tools "Out of Service" and do not use them; notify your Branch Manager or Project Manager so that the tool can be replaced or repaired. If the tools cannot be repaired they will be disposed of properly. GEI does not issue or permit the use of unsafe hand tools.

1.2.2 Personal Protective Equipment

Employees using hand tools will be provided with the personal protective equipment (PPE) necessary to help protect them from the hazards of the tool as well as the associated hazards with using the tool. (i.e., projectile debris, dust, etc.). All employees will wear work gloves, steel toe or composite toe boots, and safety glasses at a minimum. In addition, face shields and hearing protection may be required. Most hand injuries can be avoided with the proper use of PPE. PPE must be maintained in good condition, kept clean and properly stored when not in use. More information regarding PPE is located in Section 6 of GEI's Corporate Health and Safety Program.

1.2.3 General Safe Practices

Never wear sandals, open-toed or canvas shoes when working with tools. Always tie back long hair. Avoid loose-fitting clothes which might become entangled in a tool. Always remove rings and other jewelry. Never use a tool without its guard in place. Make sure your grip and footing are secure when using large tools. Never carry tools up ladders; use a tool belt, hoist, or a rope. Use extra caution when using tools at heights – a falling tool could kill a co-worker. Always pass a tool to another person by the handle – never toss it to them. Select ergonomically-designed tools for work tasks when movements are repetitive and forceful. Always make sure observers are at a safe distance. Always secure work with a vice, clamp, or other support. Moving work surfaces can cause the tool to “kick back.” Use extra caution when using power tools around flammable materials. Use fire curtains when appropriate and keep a properly charged fire extinguisher within a reasonable distance. Never surprise someone using a power tool. Check above, underneath, and behind solid surfaces if possible, to make sure it’s safe to proceed and there isn’t another person working on the other side.

1.2.4 Guarding

When power tools are designed to accommodate guards, they will be equipped with such guards prior to, and at all times during use. All guards will be in good condition and be adequate to provide protection to the employee. Regulations stipulate that the following parts of a power tool must be guarded: gears, sprockets, chain drives, belts, pulleys, drums, revolving or reciprocating parts, exposed shafts and projecting shaft ends, collars, clutches, and couplings.

1.2.5 Safety Switches

Safety switches allow the tool to be turned “off” quickly. Hand-held power tools must be equipped with a positive on-off, a momentary on-off, or a constant pressure switch. A positive on-off is a standard on-off switch. Platen sanders, disc sanders, scroll saws, and grinders with less than 2-inch-diameter discs may have a standard on-off switch. A momentary on-off can be turned “off” by a single motion of the same finger or fingers that turn it on. Drills, reciprocating and saber saws, grinders, and belt sanders may have a momentary on-off switch. A constant pressure switch shuts off power upon release. Circular saws and chain saws may have a constant pressure switch. Always test switch to insure it is functioning properly.

1.2.6 Blind Operations

A "blind" operation is any circumstance using any type of saw, drill, or other cutting or penetrating tool where you can't see behind what is being cut. When making a blind cut or drilling operation, be sure that hidden electrical wiring, water pipes, or any mechanical hazards are not in the blade path. If wires are present, they must be disconnected at the power source by a qualified person or avoided. Contact with live wires could cause lethal shock or fire. Water pipes should be drained and capped. Always hold the tool by the insulated grasping surfaces.

1.2.7 Kickback

Kickback is a sudden, uncontrolled reaction to a pinched blade, causing the tool to lift up and out of the work piece toward the operator. Misuse, buildup of sap or dirt on the blade, insufficient *set*, dullness, and unguided cuts, can all cause kickback. Avoid kickback by keeping saw blades sharp, having proper amount of *set* in the teeth, keeping saw blades clean, and support large panels so they will not pinch the blade. Set blade depth to no more than 1/4 inch greater than the thickness of the material being cut. Release the switch immediately if the blade binds or the saw stalls.

1.2.8 Power Tool Accessories

The choice of a wrong accessory or incorrect use can result in serious injury. Read and understand the recommendations in the owner/operators manual for the tool and the accessory literature. Don't use an accessory or attachment unless: the power tool manufacturer recommends its use on their product; the accessory's limitations and specifications match the limitations and specification of the power tool; the use of the accessory does not require the removal of any guards; and you understand the instructions that describe the safe use of the accessory or attachment. Always unplug tools before installing, adjusting, and changing any accessory or attachment of any kind.

1.3 Types of Power-Operated Hand Tools

Power tools include electric, battery-powered, liquid fuel, hydraulic, pneumatic (air), and powder-actuated. Power tools operate at high speeds; when things go wrong, it happens fast.

1.3.1 Electric Power-Operated – Coded

Electric power-operated tools that use a cord will either be double-insulated type or have a three-wire cord plugged into a grounded receptacle, grounded according to Occupational Safety and Health Administration (OSHA) regulations. A ground fault circuit interrupter (GFCI) will be used between the power operated tool and the power source. Test the GFCI before each use and use a portable GFCI if necessary. Power tools should always be stored in a dry place when not in use. Never use a tool in wet/damp conditions unless designed to be used in such an environment. Never carry power tools by the cord or yank the cord to disconnect it. Always keep tools and cords away from heat, oil, and sharp edges. Always disconnect power tools when not in use and when changing accessories such as blades and bits.

1.3.2 Electric Power-Operated – Battery (Cordless)

Electric power-operated tools that run on batteries should be charged in a dry location and away from all combustible materials. Do not operate cordless tools in or near flammable liquids or explosive atmospheres. Motors in these tools may spark and ignite fumes. Always recharge a cordless tool and its battery with its own specified charging unit. Never attempt to recharge a cordless tool in a recharging unit not specifically recommended for that tool. Remove batteries or lock the switch in its "OFF" position before changing accessories, adjusting or cleaning tools. This removes the power supply while hands are in vulnerable

locations such as near switches, bits, or blades. Do not store the battery pack in a container with metal objects such as wire, nails, or coins as it could short the battery. Do not expose the battery pack to moisture, frost, or temperature extremes of over 110 degrees Fahrenheit or under -20 degrees Fahrenheit.

1.3.3 Liquid Fuel Power Tools

Liquid fuel power tools will be stopped, turned “off,” and cooled while being refueled, serviced, or maintained. Fuel will be transported, handled, and stored in accordance with federal regulations. Safety Data Sheets (SDS) for fuel or chemicals will be accessible during use of the tools. The tool must be used in a well-ventilated area as the carbon monoxide generated can displace or deplete oxygen. Before refilling a fueled powered tool fuel tank, shut down the engine and allow it to cool as fuel fumes, combined with the heat from the tool, can cause an explosion. Use only Type 1 or Type 2 approved flammable liquid containers. Properly clean any spills from the refueling process.

1.3.4 Hydraulic Power Tools

The fluid used in hydraulic power tools will be fire-resistant and approved for use with the hydraulic powered tool as specified by the manufacturer. The purpose of the specialized fluid is to allow the tool to be safely used in extreme temperatures.”

1.3.5 Pneumatic Power Tools

Pneumatic (air) power tools will be properly maintained and operated according to the manufacturer’s safe operating procedures. Make sure air hose connections are secure. Use a short wire or positive locking coupler to attach the air hose to the tool. Check hoses regularly for cuts, bulges, and abrasions (tag and replace if defective). Ensure the safety clip for attachments is installed and secure. Ensure the muzzle is in contact with the surface. Never point the tool at anyone. Avoid using on easily penetrated materials unless they are backed by material that will prevent fastener from passing through. Don’t drive fasteners into very hard or brittle material that could chip, splatter, or make the fasteners ricochet. Avoid using compressed air for cleaning.

1.3.6 Powder-Actuated Tools

Only employees who have been trained in the operation of the particular tool in use will be allowed to operate a power-actuated tool. Never use in an explosive or flammable atmosphere. Never load the tool unless it will be used immediately. Never leave a loaded tool unattended. Never point the tool at anyone. Always keep hands and feet clear of the barrel end. Always select a powder level that will do the work without excessive force. Avoid using on easily penetrated materials unless they are backed by material that will prevent fastener from passing through. Don’t drive fasteners into very hard or brittle material that could chip, splatter, or make the fasteners ricochet.

1.4 Powered Hand Tools

1.4.1 Drills

Be sure the trigger switch actuates properly. If equipped with a lock-on, be sure it releases freely. Be sure the chuck is tightly secured to the spindle. Tighten the drill bit securely as prescribed by the manual. Check auxiliary handles to be sure they are securely installed. Never force a drill; apply only enough pressure to keep the drill bit cutting smoothly. If the drill binds in the work, release the trigger immediately. Unplug the drill from the power source and then remove the bit from the work piece. Never attempt to free a jammed bit by starting and stopping the drill. Review the manufacture's manual for how to unjam the equipment. Unplug the tool before changing bits, accessories, or attachments.

1.4.2 Saws

Circular Saws

Always use sharp blades. Dull blades can cause binding, stalling, and possible kickback. Check blades carefully before each use for proper alignment and possible defects. Be sure all cords are out of the blade path and are sufficiently long to freely complete the cut. Clamp materials whenever possible. Never hold a work piece in your hand when sawing.

Set blade depth to no more than 1/4 inch greater than the thickness of the material being cut. Always allow the blade to reach full speed before the work piece is contacted. Never overreach and never reach under the saw or work piece. Never use a circular saw for cutting logs or roots, trimming trees, or shrubs.

Reciprocating Saws

Always use sharp blades. Dull blades cause binding, stalling, and possible kickback. Only use the blade specifically recommended for the job being done. Be sure all cords are out of the blade path and are sufficiently long to freely complete the cut. Position yourself to maintain full control of the tool and avoid cutting above shoulder height. The work piece must be clamped securely and the shoe of the saw held firmly against the work. When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the work piece. Remember that the blade and blade clamp may be hot immediately after cutting. Avoid contact until they have cooled.

Jig/Saber Saws

Check that the blades are secured in position before plugging in. Make sure the cord is not in the line of cut. Firmly position the tool's base plate/shoe on the work piece before turning on the tool. Keep your hands and fingers well clear of moving parts. After making partial cuts, turn "off" and remove the blade from the work piece only after the blade has fully stopped. Maintain firm contact between the base and the material being cut, throughout cutting procedures. Remember that the blade and blade clamp may be hot immediately after cutting. Keep your hands away until cooled down and never overreach.

1.4.3 Abrasive Wheels and Tools

Sanders

Sanding dust can be highly explosive if the concentration becomes too great. Ensure the work area has adequate ventilation. Always use of exhaust type systems or bag collection. Check the power supply to be sure the switch and switch lock are in the "off" position. Always use the appropriate size disk or belt. Use jigs or fixtures to hold your work piece whenever possible. When sanding, always be aware of the cord location.

Never force a sander – the weight of the tool applies adequate pressure. Do not expose the tool to liquids, or to use in wet locations. When adjusting the tracking of the belt, be certain to avoid accidental contact with yourself or other objects.

Grinders

Test grinding wheels before mounting by tapping the wheel lightly with a nonmetallic implement. If it produces a ringing sound, it is in good condition. If it sounds dull, replace the wheel, Never use a cracked wheel. Use only those wheels and discs marked with a rated speed at or above the speed rating on the nameplate of the tool. Never operate a grinder without the proper guards in place. Always allow the wheel to come up to full speed before you contact the work piece. Do not apply excessive pressure to the wheel or disc. Use grinding wheels when working with hard materials, and use rotary files for soft materials such as aluminum, brass, copper, and wood. Using grinding wheels on soft materials will excessively load the wheel and could cause the wheel to shatter or disintegrate.

Power

Grinding machines will be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operations. Follow manufacturer recommendations for sufficient power supply.

Guarding

Grinding machines will be equipped with safety guards in conformance with the requirements of the American National Standards Institute (ANSI) B7.1-1970.

Routers

Always disconnect the plug from the electrical outlet before changing bits or making any adjustments. Install router bits securely. Make certain that the cutter shaft is engaged in the collet at least ½-inch. Always face the cutter blade opening away from your body. The switch should be in the "off" position before plugging into the power outlet. Always allow the motor to reach full speed before feeding the router into the work. Never attempt to remove debris while the router is operating. Secure clamping devices on the work piece before operating router. When removing a router from your work piece, always be very careful not to turn the base and bit toward you.

1.4.4 Woodworking Tools

Disconnect Switches

Fixed power driven woodworking tools will be provided with a disconnect switch that can either be locked or tagged in the “off” position.

Speeds

The operating speed will be etched or otherwise permanently marked on all circular saws over 20 inches in diameter or operating at over 10,000 peripheral feet per minute. Blades used on these types of saws must be rated to operate at or below the operating speed of the saw.

Self-feed

Automatic feeding devices will be installed on machines whenever the nature of the work will permit. Feeder attachments will have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points.

Guarding

Portable, power-driven circular saws will be equipped with guards above and below the base plate or shoe.

Personal Protective Equipment

Project-specific PPE will be identified in the HASP based on the hazards present during work tasks. Required PPE must be worn when operating power tools. More information regarding PPE is located in Section 6 of GEI’s Health and Safety Program.

Other Requirements

Woodworking tools and machinery will meet other applicable requirements of ANSI 01.1-1961, Safety Code for Woodworking Machinery.

1.4.5 Jacks – Lever and Ratchet, Screw, and Hydraulic

General Requirements

The manufacturer’s rated capacity will be legibly marked on all jacks and will not be exceeded. All jacks will have a positive stop to prevent over-travel.

Blocking

When the working area does not have a solid working surface and it is necessary to provide a firm foundation, the base of the jack will be blocked or cribbed.

Operation and Maintenance

Hydraulic jacks exposed to freezing temperatures will be supplied with adequate antifreeze liquid. Jacks will be properly lubricated at regular intervals. Jacks will be thoroughly inspected, before each use. Repair or replacement parts will be examined for possible defects. Tag worn, damaged or defective jacks “Out of Service” and do not use them; notify your

Branch Manager so that the jack can be replaced or repaired. Parts subjected to wear will be inspected on a regular basis and repaired or replaced as needed.

1.5 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.6 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection. Read and understand the recommendations in the owner/operators manual for the tool, and the accessory literature.

1.7 References

OSHA Standards for the Construction Industry, Subpart I

Risk Analytics Power Tool Safety Training, 2006

1.8 Attachments

None

1.9 Contact

Health&SafetyTeam@geiconsultants.com

1.10 Review History

- July 2016
- May 2015 – Separated from SOP HS-008

STANDARD OPERATING PROCEDURES

SOP NO. HS-009 Hazard Identification and Management

1.1 Objective

The purpose of this SOP is to outline the steps GEI personnel will take to identify potential hazards on site, the risks associated with these hazards, and the proper engineering controls, work practices, and personal protective equipment (PPE) to use to minimize the associated risks.

1.2 Hazard Identification

An initial identification of hazards should be done based on a review of available documents, including lists of chemicals used on site, analytical data from soil, surface water, groundwater, air, spill history, site history, equipment on site, maps, photos, and a preliminary survey.

1.3 Risk Identification

Once the presence and concentrations of specific hazardous substances and health hazards have been established, the risks associated with these substances will be identified. GEI employees and GEI subcontractors who will be working on the site will be informed of any risks that have been identified.

Risks to consider include, but are not limited to:

- Potential exposures exceeding the permissible exposure limits and published exposure levels.
- Potential Immediately to Life and Health (IDLH) Concentrations.
- Potential Skin Absorption and Irritation Sources.
- Potential Eye Irritation Sources.
- Potential hazardous atmospheres, including oxygen deficiency and fire and explosion hazards.

1.4 Engineering Controls, Work Practices, and Personal Protective Equipment for Employee Protection

Engineering controls, work practices, and PPE for substances regulated in OSHA Subpart Z (Toxic and Hazardous Substances) will be implemented in accordance with this section to protect employees from exposure to hazardous substances and safety and health hazards.

1.4.1 Engineering Controls, Work Practices, and Personal Protective Equipment for Substances Regulated in Subparts G (Occupational Health and Environment Control) and Subpart Z (Toxic and Hazardous Substances)

Engineering controls and work practices will be instituted to reduce and maintain employee exposure at or below the permissible exposure limits for substances regulated by 29 CFR Part 1910, to the extent required by Subpart Z, except to the extent that such controls and practices are not feasible.

Engineering controls that may be feasible include the use of pressurized cabs or control booths on equipment, and/or the use of remotely operated material handling equipment. Work practices that may be feasible include removing all non-essential employees from potential exposure during opening of drums, wetting down dusty operations, and locating employees upwind of possible hazards.

If engineering controls and work practices are not feasible, or not required, any reasonable combination of engineering controls, work practices, and PPE will be used to reduce and maintain at or below the permissible exposure limits or dose limits for substances regulated by 29 CFR Part 1910, Subpart Z.

GEI will not implement a schedule of employee rotation as a means of compliance with permissible exposure limits or dose limits except when there is no other feasible way of complying with the airborne or dermal dose limits for ionizing radiation.

The provisions of 29 CFR, subpart G, Occupational Health and Environment control, will be followed.

1.4.2 Engineering Controls, Work Practices, and Personal Protective Equipment for Substances Not Regulated in Subparts G and Subparts Z

An appropriate combination of engineering controls, work practices, and personal protective equipment will be used to reduce and maintain employee exposure to or below published exposure levels for hazardous substances and health hazards not regulated by 29 CFR Part 1910, Subparts G and Subparts Z. GEI will use published literature and MSDS' as a guide in making the determination of what level of protection is appropriate for hazardous substances and health hazards for which there is no permissible exposure limit or published exposure limit.

1.4.3 Decontamination Procedure

Decontamination procedure(s) will be developed, communicated to employees, and implemented before any employees or equipment enter areas on site where potential for exposure to hazardous substances exists. Procedures will be developed to minimize

employee contact with hazardous substances or with equipment that has contacted hazardous substances.

All GEI employees leaving a contaminated area will be properly decontaminated; all contaminated clothing and equipment leaving a contaminated area will be properly disposed of or decontaminated.

Decontamination procedures will be monitored by the site safety officer to determine their effectiveness. When such procedures are found to be ineffective, the site safety officer will contact the CHSO and appropriate steps will be taken to correct any deficiencies.

1.4.3.1 Location

Decontamination will be performed in geographical areas that will minimize the exposure to employees, equipment, and the environment.

1.4.3.2 Equipment and Solvents

All equipment and solvents used for decontamination will be decontaminated or disposed of properly.

1.4.3.3 Personal Protective Clothing and Equipment

Protective clothing and equipment will be decontaminated, cleaned, laundered, maintained or replaced as needed to maintain their effectiveness.

Employees whose clothing becomes wetted with hazardous substances will immediately remove that clothing and proceed to shower. The clothing will be disposed of or decontaminated before it is removed from the work zone.

1.4.3.4 Commercial Laundries or Cleaning Establishments

Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment will be informed of the potentially harmful effects of exposures to hazardous substances.

1.4.3.5 Showers and Changing Rooms

Where the decontamination procedure indicates a need for regular showers and change rooms outside of a contaminated area, they will be provided and meet the requirements of 29 CFR 1910.141 (Sanitation). If temperature conditions prevent the effective use of water, then other effective means for cleansing will be provided and used.

1.5 Limitations

None

1.6 References

OSHA 1910.120 Hazardous Waste Operations and Emergency Response
OSHA 1910 Subpart G Occupational Health and Environment Control
OSHA 1910 Subpart Z Toxic and Hazardous Substances
OSHA 1910.141 General Environmental Controls - Sanitation

1.7 Contact

GEI Corporate Health and Safety Officer
GEI Mid-West Regional Health and Safety Officer
GEI Atlantic Regional Health and Safety Officer
GEI New England Regional Health and Safety Officer
GEI Western Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURES

SOP No. HS-010 Inclement Weather

1.1 Objective

Inclement weather can affect work activities and pose safety hazards to employees working in these conditions. The following guidelines will be followed when weather conditions become a safety concern.

1.2 Execution

All employees will be aware of local weather conditions and monitor any advisories issued by the National Weather Service and other local reporting services. Depending on location and season, storms are capable of producing heavy rain, floods, extreme temperatures, high wind conditions, lighting, tornados, and/or snowfall.

1.2.1 Heavy Rain

If working or driving in a storm use extreme caution and turn your lights on when the rainfall becomes heavy. Employees should be aware of the following:

- Heavy rain causes visibility issues, especially when driving.
- Surfaces and tools become slippery.
- If you are working in the rain and your clothes become wet there is a risk of hypothermia when exposed to winds, even in warm temperatures.
- If the storms are going to produce thunder and/or lightning, leave the work area immediately and move to a safe area.
- Use your best judgment to determine if the rainfall becomes too heavy to continue working safely.

1.2.2 Lightning

Lightning can strike as far as 10 miles from the area where it is raining. That's about the distance you can hear thunder. **If you can hear thunder, you are within striking distance. Seek safe shelter immediately.** This can be within a building or vehicle. Wait 30 minutes after the last clap of thunder or flash of lightning before going outside again.

1.2.3 Flooding

Flooding may occur as a result of heavy rain in a short period of time. Flooding can be particularly acute in canyon areas where dry creek beds can turn into raging rivers from rainfall in distant or higher elevation areas. Be aware of this and your surroundings and move to a safe place if you begin to see any signs that flooding may occur. Do not

attempt to drive through areas or streets that are flooded. Seek alternate routes. Be particularly cautious at night when flooded areas are difficult to see. Urban flooding can stop traffic and increase the potential for traffic accidents and being trapped in vehicles.

1.2.4 Extreme Temperatures

Work activities may take place in extreme heat or cold. Be prepared if these conditions are anticipated. Have the correct personal protective equipment (PPE) available, exercise proper fluid intake, and take breaks to complete work and prevent heat and cold stress. For more information about these conditions see the heat stress and cold stress programs found in GEI's Health and Safety Manual.

1.2.5 High Wind and Tornadoes

Tropical storms are described as storms with sustained winds ranging from 39 to 73 miles per hour (mph) and hurricanes produce sustained winds that exceed 74 mph. When winds approach 40 mph (gale force winds) twigs begin to break off of trees and vehicles will veer off of the road. When winds approach 40 mph or the GEI employee feels unsafe based on the activities being performed, work is to be stopped and you should seek shelter as soon as possible. Blowing or falling debris and overhanging limbs/signs can be a significant hazard. Avoid driving in these conditions; 70 percent of injuries during hurricanes are a result of vehicle accidents. Note that tall or elevated equipment will have manufacturer's safe operating wind speeds defined that could be less than 40 mph, the operator's manual should be consulted prior to operation of the equipment.

A tornado is a violent, dangerous, rotating column of air that is in contact with both the surface of the earth and a cumulonimbus cloud or, in rare cases, the base of a cumulus cloud. The Fujita Scale is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure. Based on the Fujita Scale or F-Scale Numbers begin at F0: 40-72 mph and go to F6: 319-379 mph (F6 is generally theoretical). Nearly three-fourths of all tornadoes are on the weak F0-F1 scale with just over two-thirds of deaths resulting from the violent F4-F5 tornadoes. All tornado wind speeds exceed the 40 mph stop work speed, shelter should be taken immediately if a tornado is seen. If a tornado siren is sounded move immediately to safety indoors and then move to a windowless interior space, basement, stair well etc., or designated fall-out shelter if available. Windows should not be opened before an oncoming tornado, keep the building envelope closed to the extent possible. If there is no shelter available seat belt yourself into your stationary vehicle or seek a depression or low spot on the land surface.

1.2.6 Snowfall and Ice Conditions

Working in the winter months will result in activities taking place during periods of snowfall or icy conditions. If you are working during or after snow has fallen, dress appropriately for the conditions. Snow and ice can cause working surfaces to become

slippery; clear snow and ice from all work areas to prevent slip hazards. Use caution when performing any snow or ice removal activities to prevent injuries. Driving in snowy and icy conditions is also hazardous. Reduce speed and use caution if you must drive in these conditions.

If the weather conditions deteriorate and you do not feel safe working in these conditions, stop work, move to a safe indoor location, and contact your Project Manager to let them know the weather and work status and your location.

1.3 Limitations

- Follow safety procedures as defined in the site-specific health and safety plan (HASP) at all times.
- Protection from working in extreme weather conditions can best be accomplished if the conditions are anticipated. Monitor local weather conditions prior to starting work.

1.4 References

Center for Disease Control and Prevention – Natural Disasters and Severe Weather
<http://www.bt.cdc.gov/disasters/>
National Lightning Safety Institute
NOAA, National Weather Service
Office of Climate, Water, and Weather Services

1.5 Attachment

None

1.6 Contact

GEI Corporate Health and Safety Officer
GEI Mid-West Regional Health and Safety Officer
GEI Atlantic Regional Health and Safety Officer
GEI New England Regional Health and Safety Officer
GEI Western Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURES

SOP No. HS-012 Noise Exposures

1.1 Objective

Working in loud environments can cause hearing damage and loss if the proper protection is not in place. The following procedures describe methods to mitigate unhealthy noise levels and protect hearing.

1.2 Execution

Prior to working on any project, an Activity Analysis or Job Hazard Analysis must be performed by the Project Manager or their designee to evaluate the potential hazards and identify steps to be taken to protect all workers from any hazard. If projects involve high levels of noise from such sources as heavy equipment, power tools, pumps, generators, or any other noise source employees must take steps to remove the noise exposure. GEI has an established Hearing Conservation Program located in the GEI Health and Safety Manual.

Hearing protection is required if noise levels in a work area are known to be above 85 decibels (dB), which can be measured with a noise meter. When decibel levels are not known, hearing protection is required if you need to raise your voice to talk to someone standing within a normal speaking distance from you.

The first option for employee protection from hazardous noise levels is to remove the hazard by taking away the source of the noise or using engineering controls to reduce the level. If this cannot be accomplished, the next control measure to be used is to remove the worker from the source. This can be done by moving the work area to a quieter location or distancing the worker from the noise source. For example, GEI employees do not need to be standing next to an operating drill rig or other heavy equipment, by distancing themselves from heavy equipment or other noise sources the need for hearing protection can be eliminated. The final option for worker protection is personal protective equipment (PPE). Disposable ear plugs are made available to GEI employees and are to be used when required. Additional means of hearing protection will be provided, such as ear muffs, if the disposable ear plugs are not adequate.

Employees should be aware of surroundings such as moving equipment, traffic, and other site hazards when wearing hearing protection.

1.3 Proper Use of Hearing Protection

DISPOSABLE EAR PLUG FITTING INSTRUCTIONS

Before fitting any ear plugs, make sure your hands are clean.
 Foam ear plugs are disposable and not intended for reuse.

Hold the ear plug between your thumb and forefinger. Roll and compress the entire ear plug to a small, crease-free cylinder. While still rolling, use your other hand to reach over your head and pull up and back on your outer ear. This straightens the ear canal, making way for a snug fit.



Insert the ear plug and hold for 20 to 30 seconds. This allows the ear plug to expand and fill your ear canal.



Test the fit. In a noisy environment, and with earplugs inserted, cup both hands over your ears and release. You should not notice a significant difference in the noise level. If the noise seems to lessen when your hands are cupped over your ears, your ear plugs are not fitted properly. Remove and refit following instructions.



Always remove ear plugs slowly, twisting them to break the seal. If you remove them too quickly, you could damage your ear drum.



REUSABLE EAR PLUG FITTING INSTRUCTIONS

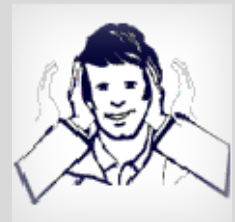
Before fitting any ear plugs, make sure your hands are clean. Reach around your head and pull up and back on your outer ear. This straightens out the ear canal, making way for a snug fit.

Reusable ear plugs should be inspected and cleaned often in soapy water. If they become hard, torn, or deformed they should be replaced.

Hold the stem end of the ear plug and insert it well inside your ear canal until you feel it sealing and the fit is comfortable.



Test the fit. In a noisy environment, and with ear plugs inserted, cup both hands over your ears and release. You should not notice a significant difference in the noise level. If the noise seems to lessen when your hands are cupped over your ears, your ear plugs are not fitted properly. Remove and refit following instructions.



Always remove ear plugs slowly, twisting them to break the seal. If you remove them too quickly, you could damage your ear drum.



1.4 Limitations

- Follow safety procedures as outlined in the site-specific health and safety plan (HASp) at all times.
- Any type of hearing protection that is used must be worn properly in order to provide the intended amount of protection. If PPE is not worn properly, exposure to the hazard may occur.

1.5 References

OHSA 29 CFR 1910.95 – Occupational Noise Exposure

OHSA 29 CFR 1926.101 – Hearing Protection

Texas American Safety Company (TASCO)

1.6 Attachment

None

1.7 Contact

GEI Corporate Health and Safety Officer
GEI Atlantic Regional Health and Safety Officer
GEI New England Regional Health and Safety Officer
GEI Midwest Regional Health and Safety Officer
GEI Western Regional Region Health and Safety Officer

STANDARD OPERATING PROCEDURE

SOP HS-014 Utility Mark-out

1.1 Objective

This SOP provides guidance for utility mark-out procedures related to drilling, excavation, or other sub-surface or intrusive activities to avoid injury to GEI employees or property damage. This SOP is applicable when GEI is responsible for its operation or our subcontractor's operation for utility mark-out.

Clients or local agencies may have additional requirements or procedures for the marking of utilities. If local utility mark-out procedures differ from those described within this SOP, applicable state or municipal regulations should be followed.

1.2 Execution

- The contractor or GEI employee visits the site and marks out each exploration area with white paint, flags, or stakes. Mark-outs will be performed wearing all required PPE, including eye protection when using spray paint to perform the mark-out.
- All exploration locations should be marked out with sample identification number(s) and type of sample (e.g., boring, test-pit, or monitoring well).
- The contractor compiles information about the work areas on a request form specified by the state utility mark-out program and provides this information to the mark-out program call center with a phone call or electronic submittal. Work area location maps can be sent to the utility mark-out program to clarify locations.
- The mark-out program customer service representative will provide a mark-out ticket number and a list of utilities notified upon receipt of the request information. This information will be recorded on the GEI documentation form or in other project documents.
- If known, the contractor will also notify any non-member utility operators (such as apartment complexes, commercial complexes, railroads with communication cables, etc.).
- Utility companies or their sub-contractors will only mark-out, or clear, utilities under their responsibility. Generally, this means that they will only mark-out utilities within the public right-of-way up to private property boundaries. Information needed to determine the location of utilities on private properties will be requested from the property owner. This may include available

property drawings or as-built figures. If this information is not available, additional non-intrusive surveys of the property may be required by a private utility locator to find underground utilities by using techniques, including ground penetrating radar (GPR).

- American Public Works Association (APWA) Uniform Color Code For Marking Underground Utility Lines are:
 1. **White** – Proposed Excavation
 2. **Pink** – Temporary Survey Markings
 3. **Red** – Electric Power Lines, Cables, Conduit and Lighting Cables
 4. **Yellow** – Gas, Oil, Steam, Petroleum, and Gaseous Material
 5. **Orange** – Communications, Alarm, Signal Lines, Cables or Conduit
 6. **Blue** – Water
 7. **Purple** – Radioactive Materials
 8. **Green** – Sanitary and Storm Sewers and Drain Lines

- Before the intrusive work activities begin, the contractor will verify that each utility company has completed a utility location for the work area or the location has been cleared by a private locator and record this on the mark-out request information sheet.
- A visual survey of the project area will be done prior to the start of intrusive activities. This visual inspection will be done to identify any signs, manholes, utility boxes, or other evidence of an underground utility is present and has been considered.
- The contractor can begin work on the scheduled work date and time if all the utility operators have responded, taking care to find and preserve any markings that have been made.
- Completed clearance documentation will be located on the excavation site during excavation activities and kept in project files.
- When excavating near a buried utility, observe the approximate location around that utility.
- If exposing a utility, proper support and protection must be provided so that the utility will not be damaged.
- If the excavation work requires significant spans of the utility to be exposed, it is the contractor's responsibility to support them (to prevent sagging or collapse) as needed. Contact the utility operator for support, guidance, or assistance.
- When the excavation is complete, provide proper backfill for any utilities that have been exposed.

- Take care not to damage the conduit or protective coating of a utility. If the contractor damages this, leave the damaged utility exposed and immediately call the utility owner.
- If a gas line is contacted, the contractor must notify police, fire, and emergency personnel, and evacuate employees according to the site evacuation procedures. No attempt should be made to tamper with or correct the damaged utility.
- If the contractor/consultant needs to dig within the approximate location of a combustible, hazardous fluid, or gas line (natural gas, propane or gasoline), soft digging is required (hand digging, vacuum extraction) to a maximum depth of five feet. The approximate location is defined as 24 inches on either side of the designated center line of the utility if the diameter is not provided or 24 inches from each outside edge if the diameter is provided.

1.3 Limitations

- Mark-out notification time usually does not include holidays. Make sure holidays are considered and mark-out time is scheduled accordingly. Under no circumstances are intrusive activities allowed to be performed prior to the required mark-out.
- Do not use white paint if precipitation is eminent. Consider using stakes if snow is predicted.

1.4 References

Call 811 to contact the utility mark-out agency for the state you are calling from or use the contact information below.

Arizona

Name: Arizona Blue Stake

Telephone: 1 (800) 782-5348

Website: www.azbluestake.com

Wait time after notification: 2 business days (excluding holidays)

Connecticut

Name: Call-Before-You-Dig (CBYD)

Telephone: 1 (800) 922-4455

Website: www.cbyd.com

Wait time after notification: 2 business days (excluding holidays)

Expiration of mark-out: 30 days

Colorado

Name: Utility Notification Center of Colorado
Telephone: (800) 922-1987 or (303) 232-1991
Website: www.uncc2.org
Wait time after notification: 2 business days (excluding holidays)
Expiration of mark-out: 30 days

Hawaii

Name: Hawaii One Call
Telephone: (866) 423-7287
Website: www.callbeforeyoudig.org
Wait time after notification: 5 business days (excluding holidays)
Expiration of mark-out: 28 days

Illinois

Name: **JULIE**, Inc. (for all of Illinois except the City of Chicago)
Telephone: (800) 892-0123
Website: www.illinois1call.com
Wait time after notification: 2 business days (excluding holidays)
Expiration of mark-out: 14 days

Name: **Digger** (City of Chicago only)
Telephone: (312) 744-7000 Website: www.iupps.org
Wait time after notification: 2 business days (excluding holidays)
Expiration of mark-out: 14 days

Indiana

Telephone: (800) 382-5544
Website: www.iupps.org
Wait time after notification: 2 business days
Expiration of mark-out: 20 days after call in

Kansas

Kansas One Call
Telephone: (800) DIG-SAFE or (316) 687-2102
Website: www.kansasonecall.com
Wait time after notification: 2 business days (excluding holidays)

Massachusetts, Maine, New Hampshire, Rhode Island, Vermont

Name: Dig Safe System, Inc.
Telephone: 1 (888) DIGSAFE (344-7233)
Website: www.digsafe.com
Wait time after notification: 3 business days (2 business days in VT)
Expiration of mark-out: 30 days (ME, NH, VT); 60 days (RI);
None (MA)

Michigan

Name: Miss Dig System, Inc.

Telephone: (800) 482-7171

Website: www.missdig.org

Wait time after notification: 3 business days

Expiration of mark-out: 21 days

Minnesota

Name: Gopher State One Call

Telephone: (800) 252-1166 or (651) 454-0002

Website: www.gopherstateonecall.org

Wait time after notification: 2 business days

Expiration of mark-out: 14 days

Nebraska

Name: Diggers Hotline of Nebraska

Telephone: (800) 331-5666 or (402) 344-3565

Website: www.ne-diggers.com

Wait time after notification: 3 business days (2 business days in VT)

Expiration of mark-out: 30 days

New Jersey

Name: New Jersey One Call

Telephone: 1 (800) 272-1000

Website: www.nj1-call.org

Wait time after notification: 2 business days

Expiration of mark-out: 45 days

New Mexico:

Name: New Mexico One Call System, Inc.

Telephone: 1 (800) 321-2537, (505) 260-1165

Website: www.nmonecall.org

Wait time after notification: 2 business days

Expiration of mark-out: 10 days

New York City/Long Island

Name: New York City One Call Center

Telephone: 1 (800) 272-4480

Website: www.nycli1calldsi.com

Wait time after notification: 2 to 10 days (excluding holidays)

Expiration of mark-out: 30 days

New York State

Name: Dig Safely New York

Telephone: 1 (800) 962-7962

Website: www.digsafelynewyork.com

Wait time after notification: 2 business days (excluding holidays)

Expiration of mark-out: 30 days

Northern California

Underground Service Alert of Northern California

Telephone: (800) 227-2600

Website: www.usanorth.org/

Wait time after notification: 2 business days (excluding holidays)

Expiration of mark-out: 28 days

Oregon

Name: Oregon Utilities Coordinating Council

Telephone: (800) 332-2344

Website: www.oucc.net/

Name: Utility Notification Center

Telephone: (800) 332-2344

Website: www.digsafelyoregon.com

Wait time after notification: 2 business days (excluding holidays)

Southern California

Name: Underground Service Alert of Southern California

Telephone: (800) 227-2600

Website: <http://www.digalert.org/index.asp>

Wait time after notification: 2 business days (excluding holidays)

Expiration of mark-out: 28 days

Utah

Name: Blue Stakes Location Center

Telephone: (800) 662-4111 or (801) 208-2100

Website: www.bluestakes.org/

Wait time after notification: 2 business days (excluding holidays)

Expiration of mark-out: 14 days

Wisconsin

Name: Diggers Hotline

Telephone: (800) 242-8511

Website: www.diggershotline.com

Wait time after notification: 3 business days (excluding holidays)

Expiration of mark-out: 10 days

Wyoming

Name: One Call of Wyoming

Telephone: (800) 849-2476, No Local

Website:

Wait time after notification: 2 business days (excluding holidays)

Expiration of mark-out: 14 days

1.5 Attachment

Attachment A – Standard Utility Color Codes

Attachment B – GEI Utility Clearance Documentation Form

1.6 Contact

GEI Corporate Health and Safety Officer

Mid-West Regional Health and Safety Officer

Atlantic Regional Health and Safety Officer

New England Regional Health and Safety Officer

Western Regional Region Health and Safety Officer


COLOR CODE FOR UTILITY MARKING

(BASED ON 'THE AMERICAN PUBLIC WORKS ASSOCIATION' RECOMMENDATIONS AND THE ANSI STANDARD Z-53.1 FOR SAFETY COLORS)

UTILITY	COLOR
PROPOSED EXCAVATION	WHITE
ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTING CABLES	RED
POTABLE WATER	BLUE
STEAM, CONDENSATE, GAS OR OIL COMPRESSED AIR	YELLOW
TELECOMMUNICATIONS, ALARM OR SIGNAL LINES, CABLES OR CONDUIT	ORANGE
TEMPORARY SURVEY MARKINGS	PINK
SEWER AND STORM DRAINS	GREEN
CHILLED WATER, RECLAIMED WATER, IRRIGATION AND SLURRY LINES	PURPLE
OTHER	LIGHT BLUE

1.0/4902e011.pdf

(12/2004)

	Utility Clearance Documentation
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Client: _____

Project: _____

Site: _____

Excavation/Drilling Location ID: _____

Excavator/Driller: _____

GEI PM: _____

GEI Field Team Leader: _____

Utility Drawings Reviewed: _____

Provided By: _____

Reviewed By: _____

Utility Clearance Call Date: _____

Utility Clearance Received back from (list utilities): _____

Completed By (Company): _____ Date: _____

GEI Staff Responsible for Oversight: _____

Metal Detector Survey (yes/no): _____

Drilling Location Cleared by: _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Private Location Clearance Required (yes/no): _____

Contractor: _____ Date: _____

Methods used for utility location (i.e. GPR, electronic pipe location) _____

GEI Staff Responsible for Oversight: _____

Hand clearing Performed: _____ Date: _____

Contractor: _____

GEI Staff Responsible for Oversight: _____

Notes: _____

Based upon the best available information, appropriate utility clearance procedures were performed for the invasive work specified. If client ordered/site specific deviations from existing GEI utility clearance procedures exist, they are approved by the client signature below.

Client Signature (Optional): _____

Date: _____

GEI, Inc. Representative: _____

Date: _____

STANDARD OPERATING PROCEDURES

SOP No. HS-016 Traffic Hazard Management

1.1 Objective

The objective of this Standard Operating Procedure (SOP) is to prevent or limit the potential for GEI personnel to encounter traffic hazards during field activities.

1.2 General

This SOP is intended for use by employees engaged in work with the potential for traffic hazards. The site-specific health and safety plan (HASP) will include a hazard assessment for the project that identifies the potential for exposure to traffic hazards and the control methods to be implemented by GEI employees, including review or attainment of necessary permits, traffic control plans, and flagger/police detail requirements for the local jurisdiction. Routine checks of the work zone will be made to ensure there are adequate levels of protection. These hazards will be reviewed in the project safety briefing and documented on the Project Safety Briefing form, found on the Safety page of the GEI intranet.

1.3 Traffic Hazard Management

Traffic Hazard Management is the process of identifying and managing the potential risks associated with the movement of traffic through, around, or past a work area. This Traffic Hazard Management SOP is designed to assist employees in identifying and managing these hazards. Work areas should be as safe as possible. It is the responsibility of GEI employees to follow the Traffic Hazard Management SOP and adhere to these safety standards. Safety is not negotiable.

Under no circumstances are GEI employees permitted to commence work in a situation that the employee believes or knows their health and safety, or the health and safety of others, is at risk.

Major risk factors for work site Traffic Hazard Management include:

- The speed of traffic moving through a work site.
- The distance and clearance between moving traffic, workers, vehicles and equipment, and over-head power lines.
- Traffic volume and vehicle composition.
- Nature and conditions at the work site and approaches to the work site.

- Other factors such as the time of day, sight distance, weather, presence of pedestrians, or cyclists, and the type of work being carried out.
- Other hazards in proximity to the work site (e.g., power lines, open excavations) that may have conflicting safety management measures that need to be considered when developing the HASP.

1.4 Site Preparation

The following management measures will be considered whenever working in traffic areas. In addition, remain aware of the amount of traffic around the working area. The work space should be large enough for the job to be completed safely. Check permit, traffic control plans, and flagger/police detail requirements for the local jurisdiction. Perform routine checks of the work zone to make sure there are adequate levels of protection.

1.4.1 Traffic Barriers and Warning Signs

GEI employees will comply with the U.S. Department of Transportation's (DOT) Manual on Uniformed Traffic Control Devices (MUTCD) and/or state regulations for temporary traffic barriers (cones, barriers) and sign placement when required for working in traffic areas. Clearly define the work site by placing traffic barriers around the work space to indicate the space that is needed to safely perform the work. The traffic barrier will help make the work site more visible to other workers, pedestrians, cyclists, and moving vehicles. Place traffic barriers in such a way as to give yourself and equipment adequate space to work within the barriers. OSHA suggests placing the first warning sign at a distance calculated to be 4 to 8 times (in feet) the speed limit (in MPH).

1.4.2 Adequate Light

Requirements for night conditions and work areas with poor visibility are similar to day requirements. However there are a number of additional things to consider, such as visibility of the work site to advancing traffic and sufficient lighting. OSHA requires lighting for workers on foot and equipment operators to be at least 5-foot-candles or greater.

Visibility of the work area can be increased by employing the following measures:

- Using parked vehicles hazard and flashing lights.
- Wearing reflective personal protective equipment (PPE), such as a safety vest, in good condition.
- Providing adequate lighting to illuminate the work area with lights positioned so that there is no glare to approaching drivers.
- Placing reflective advance warning signs and traffic barriers so that they are visible to road users.

1.4.3 Distance from the Nearest Traffic Lane

Work areas located along roadsides will have a minimum clearance as defined by DOT's MUTCD and/or state or local DOT regulations for traffic barrier and sign placement.

1.4.4 PPE

The proper PPE, as outlined in the project HASP, will be worn when appropriate. The color/type of safety vest will comply with site regulations.

1.5 Equipment Operation

Vehicles and heavy equipment operators should use a spotter when possible if it is necessary to drive in reverse to reduce risk of collision with oncoming traffic. If it is necessary to drive against the flow of traffic make sure this area is within the work zone and properly blocked off from oncoming traffic.

1.6 Pedestrian Safety

When working near pedestrian traffic, a safe alternate pedestrian route will be established. Refer to local regulations when establishing pedestrian walkways.

1.7 Injury Reporting

If a GEI employee suffers an injury on the job that is not life threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health & Safety Officer (RHSO).

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the RHSO will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health and Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.8 Limitations

Follow safety procedures as defined in the site-specific HASP, federal DOT, and local jurisdictions. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.9 References

DOT's Manual on Uniformed Traffic Control Devices (2009 Edition)

Hazard Exposure and Risk Assessment Matrix for Hurricane Response and Recovery

Work: <https://www.osha.gov/SLTC/etools/hurricane/work-zone.html>

1.10 Attachments

None

1.11 Contact

Health&SafetyTeam@geiconsultants.com

1.12 Review History

- November 2016
- May 2014
- November 2013
- August 2011
- October 2010 Initially HS-027 Traffic Hazards

STANDARD OPERATING PROCEDURES

SOP No. HS-018 Working Around Heavy Equipment

1.1 Objective

Working near heavy equipment operations is common on many GEI project sites. Heavy equipment can include excavators, backhoes, bull dozers, cranes, dump trucks, drill rigs, and other large equipment used in construction. The following procedures and guidelines will be considered when working around heavy equipment.

1.2 Execution

Heavy equipment can present many physical hazards that can result in serious injury or death if the proper safety precautions are not taken. The following is a list of precautions to be aware of at all times when working around heavy equipment:

- Wear appropriate PPE, including a high visibility safety vest.
- Always keep your distance from any moving vehicles.
- Never assume the vehicle operator knows where you are or where you are going. Make sure to make eye contact with the operator and communicate when working near heavy equipment. If using hand signals, discuss the signals with the equipment operator prior to starting work.
- Watch for moving equipment at all times. Construction sites can have a lot of activity and vehicles may be moving closer than you may think. Do not rely on back-up or other alarms. They may not be working or you may not hear them with the noise of the construction site in the background.
- Stay out of the swing radius of cranes, excavators, or other equipment that swings or rotates.
- Never walk beside a moving vehicle, the vehicle may turn, slip, or the load may shift causing the vehicle to go off course.
- Never ride on the outside of any moving vehicle.
- Always stay out from under a suspended load on cranes or hoists, even if it means taking the long way around.
- Never walk behind a piece of equipment that is backing up. The operator may not see you.
- If working next to heavy equipment is unavoidable, be aware of all hazards including pinch points and moving parts. Use a spotter to watch the work area for moving equipment.
- If necessary, ask the operator to stop equipment operation to perform your work tasks.
- Verify the location and operation of emergency shut off devices on the equipment.

- Be aware of the fuels and chemicals associated with the equipment. Have a spill prevention and response plan in place that includes the appropriate containment materials (i.e., spill kit).
- Do not wear loose fitting clothing when working around moving equipment (i.e., drill rig augers).
- Do not operate heavy equipment.
- Do not use cellular telephones near operating equipment.

1.3 Limitations

- Follow safety procedures provided in the site-specific health and safety plan (HASP) at all times.

1.4 References

OSHA 29 CFR 1926.600 – Subpart O; Motor Vehicles, Mechanized Equipment, and Marine Operations.

www.toolboxtopics.com/Construction

Caterpillar Safety – <http://safety.cat.com/>

1.5 Attachment

None

1.6 Contact

GEI Corporate Health and Safety Officer
Atlantic Regional Health and Safety Officer
New England Regional Health and Safety Officer
Mid-West Regional Health and Safety Officer
Western Regional Health and Safety Officer

STANDARD OPERATING PROCEDURES

SOP No. HS-025 Manual Lifting

1.1 Objective

The purpose of this Standard Operating Procedure (SOP) is to identify and reduce potential work-related musculoskeletal disorder (WMSD) hazards. The SOP is intended to comply with state regulations and safe work practices developed by the Occupational Safety and Health Administration (OSHA). Modifications to meet these requirements will be made to this program as changing laws or regulations dictate.

1.2 General

Lifting heavy items is one of the leading causes of injury in the workplace. Overexertion and cumulative trauma when lifting are significant factors for injuries. When employees use smart lifting practices and work in their “power zone”, they are less likely to suffer from back sprains, muscle pulls, wrist/elbow/spinal and other injuries caused by lifting heavy objects. Common things to consider prior to lifting an object are: weight of the object, awkward postures, high-frequency and long duration lifting, inadequate handholds, and physical/environmental factors.

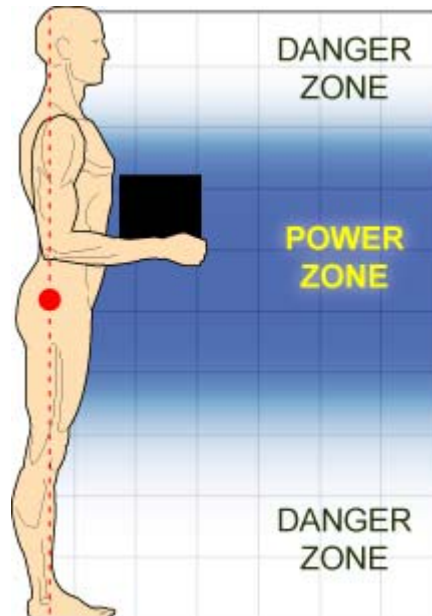


Figure 1: Lifting Power Zone

1.3 Safe Lifting Guidelines

The following safe lifting guidelines will be followed by employees involved in manual lifting activities:

- Before manual lifting is performed, a hazard assessment must be completed. The assessment must consider size, bulk, and weight of the object(s), if mechanical lifting equipment is required, if two-man lift is required, whether vision is obscured while carrying and the walking surface and path where the object is to be carried.
- Get a co-worker to help if equipment or other item is too heavy to lift.
- If possible, use powered equipment instead of manually lifting heavy materials. Lifting equipment such as dollies, hand trucks, lift-assist devices, jacks, or carts can be provided for employees.
- Reduce lifts from shoulder height and from floor height by repositioning the shelf or bin to closer to the power zone.
- Make sure walkways are clear of tripping hazards before moving materials.
- Use your legs and keep your back in a natural position while lifting. Keep the load close to your torso.



- Test the load to be lifted to estimate its weight, size, and bulk and to determine the proper lifting method.
- Do not twist while carrying a load. Instead, shift your feet and take small steps in the direction you want to turn.
- Make sure there are appropriately marked and sufficiently safe clearances for aisles and at loading docks or passageways where mechanical-handling equipment is used.
- Properly stack loose or unboxed materials which might fall from a pile by blocking, interlocking, or limiting the height of the pile to prevent falling hazards.
- Bags, containers, bundles, etc. should be stored in tiers that are stacked, blocked, interlocked, and limited in height so that they are stable and secure to prevent sliding or collapse.

- Storage areas should be kept free from accumulation of materials that could lead to tripping, fire, or explosion.
- Work methods and stations should be designed to minimize the distance between the person and the object being handled.

Supervisors should periodically evaluate work areas and employees' work techniques to assess the potential for and prevention of injuries. New operations should be evaluated to engineer out hazards before work processes are implemented.

1.4 Regulations

OSHA does not have a standard which sets limits on how much a person may lift or carry. They do however state that lifting loads heavier than about 50 pounds will increase the risk of injury.

The National Institute for Occupational Safety and Health (NIOSH) has developed a mathematical model that helps predict the risk of injury based on the weight being lifted and other criteria. The NIOSH model is based on previous medical research into the compressive forces needed to cause damage to bones and ligaments of the back. The mathematical model is incorporated in the *Applications Manual for the Revised NIOSH Lifting Equation*, which can be found on the NIOSH website (<http://www.cdc.gov/niosh/docs/94-110/>). It should be noted, however, that this NIOSH document provides only voluntary guidelines.

If there is a situation that arises where an employee is required to perform manual lifting on a reoccurring basis, the NIOSH Lifting Equation will be used to determine the appropriate weight that employee can safely lift. The lifting equation establishes a maximum load of 50 pounds for employees that are less likely to have to lift something, and don't have to do any long distance travel or maneuvering of the item. This 50 pounds is then adjusted to account for:

- how often the employee is lifting
- twisting the back during lifting
- the vertical distance the load is lifted
- the distance of the load from the body
- the distance the employee must move while lifting the load
- how easy it is to hold onto the load

GEI uses 50 pounds as a standard. However each individual should not attempt to carry loads heavier than they can safely manage.

1.5 Training

Training will include general principles of ergonomics, correct manual lifting techniques to avoid musculoskeletal injuries, recognition of hazards and injuries, procedures for reporting hazardous conditions, and methods and procedures for early reporting of injuries.

1.6 Lifting Assistance

If employees are assigned a task that involves repetitive lifting and carrying of equipment the Safety Team and Project Manager should be contacted to conduct an ergonomic evaluation. The task should be discussed to determine if there is an alternative method that can be used. The alternative method should institute an engineering or administrative control to reduce/limit the amount of lifting that is required of the employee. Some examples include providing smaller containers to reduce the weight of what needs to be lifted; providing a device that helps carry awkwardly-shaped objects easier; or using a winch, fork lift, or other device to lift the item(s) for the employee.

1.7 Injury Reporting

Injuries experienced during manual lifting activities should receive prompt medical attention. If a GEI employee suffers an injury on the job that is not life threatening, call Medcor Triage at 1-800-775-5866 to speak with a medical professional. Then, immediately report the injury to the Supervisor/Project Manager and Regional Health and Safety Officer.

After verbal notification has been made, an Incident Report Form is to be completed by the employee and/or Supervisor/Project Manager and submitted to the People & Safety Team immediately following care of the incident. This form is available on the Safety App (smart phones) and on the Safety page on the GEI intranet.

Upon notification from a Branch or Office Manager, Human Resources, and/or the receipt of the Incident Report Form, the Regional Health & Safety Officer (RHSO) will conduct an investigation and evaluation on what happened and how and why it happened. The Corporate Health & Safety Officer (CHSO) will then recommend (as necessary) engineering controls, personal protection equipment, training or other appropriate measures to minimize the potential for future musculoskeletal injuries. The CHSO/RHSO may develop educational information based on lessons learned for distribution to GEI employees.

1.8 Limitations

Follow safety procedures for manual lifting.

1.9 References

OSHA Technical Manual (OTM), Section VII: Chapter 1 - Back Disorders and Injuries

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=29936 (Viewed 7/12/2016)

<https://www.osha.gov/SLTC/etools/electricalcontractors/materials/heavy.html> (Viewed 7/12/2016)

1.10 Attachments

None

1.11 Contact

Health&SafetyTeam@geiconsultants.com

1.12 Review History

- July 2016
- August 2014

STANDARD OPERATING PROCEDURES

SOP No. HS-029 Overtime and Fatigue Management

1.1 Objective

A consistent standard was developed for GEI Consultants, Inc. relative to overtime / fatigue management with the aim of reducing risk associated with worker fatigue, allow for sufficient sleep, and increase mental fitness in an effort to control employee turnover and absenteeism. The following guidelines will be followed when working extended hours or work shifts on GEI projects.

1.2 General

Extended or unusual work shifts may be more stressful physically, mentally, and emotionally. Non-traditional shifts and extended work hours may disrupt the body's regular schedule, leading to increased fatigue, stress, and lack of concentration. These effects lead to an increased risk of operator error, injuries and/or accidents.

Society is oriented toward traditional daytime work hours and work at night will often intensify fatigue and reduce alertness. Workers generally will not acclimate to night work, and sleep patterns will generally be disrupted so the non-work periods do not provide full recovery, resulting in sleep deprivation. Studies suggest that it can take up to 10 days to adapt to a night time work schedule.

Fatigue is a message to the body to rest. It is not a problem if the person can and does rest. However, if rest is not possible, fatigue can increase until it becomes distressing and eventually debilitating. The symptoms of fatigue, both mental and physical, vary and depend on the person and his or her degree of overexertion. Some examples include:

- weariness
- sleepiness
- irritability
- reduced alertness, lack of concentration and memory
- lack of motivation
- increased susceptibility to illness
- depression
- headache
- giddiness
- loss of appetite and digestive problems

Employees and Subcontractors will adhere to the following principles to address worker Overtime / Fatigue Policy:

- Maximum Number of Days in a 21-Day Window = Nineteen (19) days
- Number of Days off = Two (2) days
- Maximum Number of Hours in a Shift = Sixteen (16) Hours / Eighteen (18) hours with approval from
 - GEI
- High Overtime Percentage = Overtime totaling more than 75% over a 40 hour work week
- High Overtime Period = last rolling 3 months

1.3 Training

Initial and annual training must be provided on how to recognize fatigue, how to control fatigue through appropriate work and personal habits, and reporting of fatigue to supervision. During training instructors will emphasize that proper sleep and nutrition can also help reduce worker fatigue.

1.4 Ergonomic Controls

Ergonomic equipment will be used to improve workstation conditions such as anti-fatigue mats for standing, lift assist devices for repetitive lifting, proper lighting and control of temperature, and other ergonomic devices as deemed appropriate (see GEI Safe Lifting SOP). Work tasks to control fatigue will be analyzed and evaluated periodically by GEI's health and safety staff. Assessments can be requested per GEI's Ergonomic Program. In addition, to reduce fatigue, chairs should be used by employees to sit periodically and take provide periodic rest breaks.

1.5 Safety Critical Positions

Employees identified as working in safety critical positions, such as working with hazardous materials or operating equipment, must report fatigue/tiredness and lack of mental acuity to their supervisors or Project Manager. In addition the Corporate Health and Safety Officer will be notified to make safety critical decisions and take appropriate actions to prevent loss.

1.6 Prescription and OTC Drug Use

Employees must not chronically use over-the-counter or prescription drugs to increase mental alertness. Employees should refrain from taking any substance known to increase fatigue in that employee, including fatigue that sets in after the effects of the drug wear off.

1.7 Limitations

Follow safety procedures as defined in the site-specific HASP. Appropriate PPE must be worn correctly to provide the intended level of protection.

1.8 References

1.9 <https://www.osha.gov/SLTC/emergencypreparedness/guides/extended.html>

1.10 Attachments

None

1.11 Contact

Corporate Health & Safety Officer
East Regional Health & Safety Officer
South Regional Health & Safety Officer
Central Regional Health & Safety Officer
West Regional Region Health & Safety Officer