Remedial Investigation Work Plan

The Peninsula
NYSDEC BCP Site No. C203097
1221 Spofford Avenue
Tax Lot 35 of Tax Block 2738
Bronx, New York

February 6, 2018

Prepared for:

THE PENINSULA JV, LLC
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Prepared by:

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1. Introduction

Roux Associates, Inc. (Roux Associates), on behalf of The Peninsula JV, LLC (Requestor), has prepared this Remedial Investigation Work Plan (RIWP) for a site located at 1221 Spofford Avenue (Block 2738, Lot 35), Borough of the Bronx, City of New York (Figure 1) (Site). The Site is currently occupied by the vacant Spofford Juvenile Detention facility. The Site is the future location of Phase 1 and Phase 2 of the Peninsula Redevelopment Project (Project) which includes the construction of a vibrant live-work campus featuring affordable housing, community space, open/recreational space, industrial space, and retail space. The Site encompasses an area of approximately 3.8 acres which is planned to be investigated, remediated and redeveloped under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). As part of the Site preparation for the redevelopment project, the Requestor will undertake the demolition of the existing Spofford Juvenile Detention facility.

1.1 Brownfield Cleanup Program Application and Environmental Work Plans

The Requestor is applying to the NYSDEC BCP as a Volunteer, and anticipates acceptance into the program in July 2017. Assuming acceptance into the BCP, the Brownfield Cleanup Agreement (BCA) is expected to be executed in August 2017. This RIWP was developed in accordance with the DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010 (DER-10) issued by NYSDEC. The purpose of the remedial investigation (RI) is to determine the nature and extent of contamination at the Site, characterize environmental media at the Site, qualitatively assess the potential exposure of receptors to Site contaminants, and develop any other additional data necessary to support the development of a Remedial Action Work Plan (RAWP).

1.2 RIWP Document Organization

This RIWP contains a background section (Section 2) describing the Site, its history, and results of previous environmental investigations; a section defining the objectives and scope of the RI (Section 3); and Sections 4 and 5 that describe project operations plans (e.g., Quality Assurance/Quality Control, Health and Safety). Reporting requirements and the project schedule are discussed in Section 6. Tables are also provided that summarize previously-collected environmental quality data. Maps and figures are provided to illustrate site conditions, and locations of proposed sampling efforts.

1.3 Project Team and Contact Information

Roux Associates' Principal-In-Charge for this Site will be Frank Cherena, Principal Geologist. Mr. Cherena, who is based in Roux Associates' Islandia, New York headquarters office and can be reached at (631) 232-2600, will be responsible for the overall implementation of the project. Roux Associates' Project Manager will be Jeffrey Wills, Senior Hydrogeologist, who will be responsible for day-to-day management of the project, including preparation of work plans, scoping and directing field activities. Kathryn Sommo will serve as the Quality Assurance Officer (QAO) to ensure the samples are collected and analyzed in accordance with the Quality Assurance Project Plan (QAPP) and will also communicate with the analytical laboratory and data validator to resolve any potential issues. The Field Analyst for the duration of the project will be Ronald Lombino, Project Hydrogeologist, who will be responsible for implementing and directing field activities onsite.

The name and contact information for the Requestor is:

Blaise Rastello II
The Peninsula JV, LLC
c/o Gilbane Development Company
7 Jackson Walkway
Providence, Rhode Island 02903

Drilling, analytical, geophysical survey, waste disposal, and other subcontracted services have not been selected as of preparation of this RIWP. This information will be provided to NYSDEC prior to the start of field activities.

1.4 Certification

I, Frank Cherena, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER-10.

Frank Cherena	February 6, 2018	
Qualified Environmental Professional	Date	Signature

2. Background

This section provides pertinent background information, including a description of the Site and its setting, the history of the Site, and the results of previous environmental investigation work conducted at the Site.

2.1 Site Description and Setting

A Site location map is included as Figure 1.

Property Location	
Property Name:	The Peninsula
Property Address:	1221 Spofford Avenue
Property Town, County, State:	Neighborhood of Hunts Point, Bronx, Bronx County, New York
Property Tax Identification:	Tax Lot 35 of Tax Block 2738
Property Topographic Quadrangle:	Central Park, New York
Nearest Intersection:	Spofford Avenue and Tiffany Street
Area Description:	The Site is in a mixed-use area of the Bronx, New York. To the north is Corpus Christi Monastery; to the South are multi-family residential and commercial properties; to the east are residential properties and to the west is commercial and industrial properties.

Property Information	
Property Acreage:	3.78
Property Shape:	Rectangular
Property Use:	Tax Lot 35 of Tax Block 2738 is currently vacant.
Improvements:	Lot 35 of Block 2738 contains a three to six-story building, asphalt paved parking, and recreation/playground spaces such as tennis and basketball courts, comprising the Spofford Juvenile Detention Center.

An Environmental Data Resources, Inc. (EDR) GeoCheck® Report is included in the Roux Associates, 2017 Phase I Environmental Site Assessment (ESA) (Roux, 2017a). The EDR report provides information regarding elevation, regional groundwater flow direction(s), Federal United States Geological Society (USGS) well information, Federal Reporting Data System (FRDS) Public Water Supply system information, and state database well information.

2.1.1 Property Operations

The Site was the location of the former Spofford Juvenile Detention Facility, later renamed as Bridges Juvenile Center, which was in operation from 1956 to 2011. The Site was temporarily closed from 1998 to 1999. Based on a 1951 Sanborn® Fire Insurance Map, a stone cutting yard, a dwelling, and "coops" are depicted in northwestern portion of the Site. Information contained in the 1927 and 1940 City

Directory indicated that a ground floor laundry facility with second floor residential apartments (according to Sanborn maps) was located on the southeast side of the property along Spofford Avenue, the actual period of operation is unknown.

2.1.2 Utilities

The following companies and municipalities currently provide utility services to the Site:

Utility	Provider
Electricity:	Consolidated Edison
Sanitary Sewerage:	NYCDEP
Potable Water:	NYCDEP
Solid Waste Removal:	Currently Not Serviced

2.1.3 Topography

A review of the United States Geological Survey (USGS) Central Park, New York 7.5-minute series topographic quadrangle map indicated that the topography in the area surrounding the Site slopes steeply to the south and west towards the East River. The elevation surrounding the Site ranges from approximately 80 feet above mean sea level (on Manida Street to the east of the Site) to 30 feet above mean sea level (on Tiffany Street to the west of the Site). The land surface grade of the former juvenile detention center is located approximately 50 feet above mean sea level and is generally flat, as it appears that the existing hill in this portion of the Site was regraded for leveling of the former juvenile detention center.

2.1.4 Wetland Areas and Surface Water Bodies

There were no wetlands identified on or adjacent to the Site according to the EDR report. There are no surface water bodies on or adjacent to the Site. The Bronx River is located approximately a half mile east of the Site and the East River is located approximately a half mile south of the Site.

2.1.5 Soil

Based on data from previous environmental reports, surface soils consist of a one to five foot thick layer of assorted fill material, including brick, wood, glass, plastic, cloths, cinders and metal. Below the fill is a native glacial silty fine to medium sand stratum with varying amounts of gravel.

2.1.6 Underlying Formation

The native glacial silty fine to medium sand stratum with varying amounts of gravel is underlain by first weathered bedrock and then competent bedrock. The depth to the weathered bedrock surface and underlying competent schist bedrock varies from approximately 8.5 to 10 feet below land surface (ft bls) in throughout the Site.

2.1.7 Groundwater

According to water-level information collected during previous environmental investigations, the depth to the water table at the Site ranges from approximately 13 feet bls to 19 feet bls and groundwater flow likely mimics

land surface and bedrock surface topography with inferred flow to southwest. Localized areas of perched water were also noted in the previous environmental investigations.

There are no public water supply wells within one-half-mile radius of the Site, as reported in the EDR Report (Roux, 2017a). In Bronx County, groundwater is not a source of potable water, as drinking water is supplied by surface reservoirs located north of New York City in the Croton and Catskill/Delaware Watersheds. These reservoirs and the corresponding distribution system are managed by the New York City Department of Environmental Protection (NYCDEP).

2.1.8 Neighboring Properties

The Site is located in a mixed-use area of the Bronx, New York. The adjacent and nearby property usage is shown in Figure 2.

A review of neighboring properties, public thoroughfares, and research of available information regarding the neighboring properties, was performed to identify areas of offsite environmental concern that could potentially adversely impact the Site. The Site is bordered to the south by mixed use multi-family residential properties and commercial properties. The Corpus Christi Monastery is located to the north of the Site. Multi/single-family residential properties and commercial properties are located west of the Site. Single-family residential properties are located to the east of the Site. There is no agricultural land use within a one-half-mile radius of the site. There are several parks within a one-half-mile radius of the Site, including Julio Carballo Fields to the northeast and Hunts Point Playground to the southeast.

2.2 Site History

Roux Associates evaluated the following information sources to determine historic uses of the property (Roux, 2017a):

- EDR Radius Map with GeoCheck, dated May 16, 2017 (EDR database report);
- City Directory search conducted by EDR;
- Aerial photographs dated 1924, 1951, 1954, 1962, 1966, 1975, 1984, 1991, 1995, 2006, 2009 and 2011;
- Historical Sanborn fire insurance maps dated 1896, 1901, 1903, 1915, 1950, 1977, 1978, 1979, 1980, 1981, 1983, 1985, 1986, 1989, 1991-1996, 1998 and 2001-2007; and
- New York City Department of Buildings (NYCDOB) Building Information System (BIS) database.

2.2.1 City Directories

A city directory abstract for the Site was obtained from EDR. Records reviewed for the time period 1927 to 2014 were sourced from New York Telephone, Manhattan and Bronx Directory Publishing Company Residential Directory, Cole Information Services, Hill-Donnelly Corporation and EDR Digital Archive. In addition, the 1927 and 1940 city directories indicated that the property on 1231 Spofford Avenue (on the southern portion of the Site) may have been occupied by a laundry facility. It is not known whether or not dry cleaning operations may have occurred at this potential laundry facility.

Noted operators/tenants of the Site comprised of listings associated with children or juvenile services, probation offices, detention center and the like from 1961 to 2014.

Nearby off-site properties include residences and commercial entities including automobile repair facilities, plumbing supply warehouse and NYC sanitation collection.

2.2.2 Aerial Photographs

Historical aerial photography may indicate past activities at a property that may not have been documented by other means, or observed during a reconnaissance visit. Aerial photographs were obtained from EDR for the years ranging from 1924 to 2011.

According to a review of the historical aerial photographs, the Site was developed by 1924. Lot 35 was developed (confirmed on Certified Sanborn maps, Section 2.2.3) with structures of undetermined use on the western sides of each respective lot. Developments in the surrounding area of the Site include the monastery and park to the north; residential properties to the east and a mix of residential and commercial properties to the west. A review of the 1924 historical aerial photograph indicated that the area immediately south of the Site was not developed at that time. By 1951, the northwest corner of Lot 35 was improved with several structures (confirmed to be a stone cutting yard on the Certified Sanborn maps). Additional structures were noted in the southwest and southeast corners of Lot 35. Increased development of the surrounding area of the Site was also observed in the 1951 historical aerial photograph. The juvenile detention center was depicted on the 1962 historical aerial photograph.

2.2.3 Certified Sanborn Fire Insurance Maps

Certified Sanborn Maps were obtained from EDR for the years ranging from 1896 to 2007. The following is a general summary of the Site and surrounding property usage, as determined by the review of the Certified Sanborn Maps:

Timeline	
Date	**Description**
1896	The Site and majority of the surrounding area is not developed.
1901, 1903	One 2-story structure (presumed to be residential) is noted on Lot 35 (1901). The Corpus Christi Monastery is noted immediately north of the Site. Additional structures in the surrounding area of the Site are presumed to be 2- and 3-story residential structures.
1915	A stone cutting yard with an office and one 1-story residential structure are noted in the northwest corner of Lot 35.
1950	The stone cutting yard has expanded to include approximately six automobile garages and an office. A second residential dwelling is noted in the area of the stone yard. The surrounding area is significantly developed since the 1915 Certified Sanborn map. The majority of developments are single- and multi-family residential buildings. In addition, two garages utilizing gasoline tanks are noted across Spofford Avenue. A metal works facility and an automobile repair shop with a gasoline tank are located west across Tiffany Street.

Timeline	
Date	**Description**
1977, 1978, 1979, 1980, 1981, 1983, 1985, 1986, 1989, 1991, 1992, 1993, 1994, 1995, 1996, 1998, 2001, 2002, 2003, 2004, 2005, 2006, and 2007	The City of New York Shelter for Delinquent Children (4-story building with partial basement), built in 1956 is noted on Lot 35. The building is divided into a gymnasium in the north portion of the building, elevators in the center and a 1-story garage on the east side. Development of the surrounding area has increased. Additional garages and automobile repair facilities; and candy manufacturing noted west of the Site along Tiffany Street (1978). Barretto Street is designated as 'closed' with a fence separating it from the Site.

2.2.4 New York City Department of Buildings Filings

According to the review of the NYCDOB BIS, Certificates of Occupancy (C/Os) were available for review for Lot 35. The C/O, dated October 11, 1957, for the former juvenile detention center building indicated the building use is 'Public' occupancy. The C/O references Fire Department approval for fuel oil installation. The C/O also provided building use information for each wing of the detention center building.

Wing (Location)	Level	Type of Use
Wing A (north corridor along Tiffany Street)	Crawl Space	Game Room and Crawl Space
	First through Third Floors	Bedrooms
Wings B and C (south corridor along Tiffany Street and east-west corridor on the west side of the Site, respectively)	First Floor	Bedrooms, Game Rooms, a Synagogue
	Second Floor	Bedrooms, Chapel, and Conference Rooms
	Third Floor	Bedrooms, Arts and Crafts
	Fourth Floor	Bedrooms
Wing D (north-south corridor on north side of Site)	Cellar	Gymnasium, Swimming Pool, Boy's Locker Room, General Storage, Supplies, and a Barber Shop
	First, Second, Third Floors	Bedrooms
	Roof	Penthouse
	Cellar	General Storage, Supplies, Barber Shop
	Basement	Visitor's Rooms, Public Waiting Area

Wing (Location)	Level	Type of Use
Wing E (north-south corridor on the south side of the Site)	First Floor	Waiting Rooms
	Second Floor	Infirmary, Bedrooms
	Third Floor	Offices
	Fourth and Fifth Floors	Bedrooms, Dining Room
	Sixth Floor	Offices
	Roof	Elevator Machine Rooms
Wing F (east-west corridor on the east side of the Site)	Cellar	Boiler Room
	Basement	Upper Part of Boiler Room, Laundry, Maintenance Room
	First Floor	Cafeteria, Kitchen, Staff Dining Room, Garage for Five Automobiles
	Second and Third Floors	Classrooms
	Fourth Floor	Classrooms, Bedrooms
	Fifth Floor	Classrooms, Dining Room

According to NYCDOB records, the elevators at the Lot 35 Site building operate with an overhead (roof mounted) gear traction motor with oil-filled buffers; and were dismantled in 2011.

2.3 Environmental Conditions/Results of Previous Environmental Investigations

This section provides an overview of previous environmental-related activities completed at the Site, based on a review of readily available information and the following previously completed environmental reports:

- Remedial Investigation Report (RIR) prepared by Louis Berger & Associates (LBA), dated May 15, 2009;
- Remedial Action Plan (RAP) prepared by LBA, dated May 21, 2010;
- Phase I ESA prepared by Arcadis, Inc., dated June 3, 2016;
- Groundwater Monitoring and Remediation Report for the Fourth Quarter 2016 prepared by URS, dated January 25, 2017;
- Roux Associates Phase I ESA, dated July 11, 2017; and
- Roux Associates Phase II ESA, dated August 10, 2017.

Summaries of the data from each of the investigations are provided on the following plates and figures:

- Plate 1 depicts soil detections above NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential SCOs (RRSCOs);
- Figure 4 depicts groundwater detections above the NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGVs); and
- Figure 5 depicts soil vapor detections compared to the New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York decision matrices.

Based on review of this information, the following environmental concerns are associated with the Site:

- Petroleum underground storage tanks (USTs) of unknown integrity;
- Documented soil and groundwater contamination from known releases;
- Soil and groundwater contamination within the building of the former Spofford Juvenile Detention Center;
- Undocumented releases from presence of historical laundry facility/potential dry cleaner; and
- Presence of historic fill of unknown origin or quality.

A summary of findings from each report, including the Site environmental history is provided below. Subsections for the evaluation of soil, groundwater and soil vapor conditions are provided for each report, as applicable.

2.3.1 Remedial Action Plan (LBA 2010)

(also includes 2009 Remedial Investigation by reference)

The 2010 LBA Remedial Action Plan (RAP), prepared on behalf of New York City Department of Juvenile Justice, documents the investigation and proposed remedy for a #2 fuel oil release (NYSDEC Spill #0812579) that occurred at the Site on February 18, 2009. Approximately 2,000 gallons of #2 fuel oil was released to the subsurface from two 12,000 gallon USTs located in the southeast courtyard of the Site.

The LBA RAP also documents analytical data and findings remedial investigation that was implemented by LBA between March 23-27, 2009. During the LBA RI, petroleum contamination was found in subsurface soils immediately surrounding the two USTs. In addition, separate phase petroleum product was observed atop groundwater perched above bedrock at soil borings installed in the boiler room adjacent to the north of the USTs and the exterior lot adjacent to the USTs.

The RI concluded the following:

- Soil contamination, including petroleum-related volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), exist at concentrations that exceed prior established standards, (and the current Restricted Residential Soil Cleanup Objectives, the reasonably anticipated Site use).
- The gravel sub-base of the concrete basement floor and the assumed gravel sub-base beneath the (presumed) UST vault likely provide a preferential pathway for the fuel oil release.
- Free product is present in basement the three borings SB-01B, SB-02, and SB-03 located closest to the vault.
- There are indications that a separate historical release occurred below the basement slab.
- Free product was observed in two exterior borings, SB-15 and SB-16, located approximately 3 feet east of the UST vault.

- Only localized pockets of perched water were observed and only beneath the basement; no groundwater was observed in the exterior borings.

As a result of the presence of separate phase petroleum product and extensive soil contamination, the 2010 LBA RAP proposed separate phase petroleum product recovery using dual-phase extraction and surfactant injection. Since contaminated soil would likely remain following implementation of the dual-phase extraction system, LBA concluded that engineering and institutional controls would be required to prevent unnecessary direct contact with the soil. This remedial approach was never implemented by LBA.

2.3.1.1 LBA RI Soil Conditions

Volatile Organic Compounds (VOCs) – Nine of the 27 soil samples collected as part of the LBA RI contained VOCs at a concentration above the UUSCOs (Plate 1).

The highest VOC concentrations were detected at location SB-16A (15.5-16 ft bls):

- 1,2,4–Trimethylbenzene – 790 mg/kg (compared to 3.6 mg/kg UUSCOs, and 52 mg/kg RRSCOs);
- 1,3,5–Trimethylbenzene – 180 mg/kg (compared to 8.4 mg/kg UUSCOs, and 52 mg/kg RRSCOs);
- Ethylbenzene – 120 mg/kg (compared to 1 mg/kg UUSCOs, and 41 mg/kg RRSCOs);
- Napthalene – 390 mg/kg (compared to 12 mg/kg UUSCOs, and 100 mg/kg RRSCOs);
- n-Butylbenzene – 60 mg/kg (compared to 12 mg/kg UUSCOs, and 100 mg/kg RRSCOs);
- n-Propylbenzene – 110 mg/kg (compared to 3.9 mg/kg UUSCOs, and 100 mg/kg RRSCOs);
- sec-butylbenzene – 68 mg/kg (compared to 11 mg/kg UUSCOs, and 100 mg/kg RRSCOs);
- Toluene – 120 mg/kg (compared to 0.7 mg/kg UUSCOs, and 100 mg/kg RRSCOs); and
- Xylenes (total) – 730 mg/kg (compared to 0.26 mg/kg UUSCOs, and 100 mg/kg RRSCOs).

Semivolatile Organic Compounds (SVOCs) – SVOCs exceeded the UUSCOs and RRSCOs in soil samples SB-18B and SB-20, located immediately to the north and west of the USTs (Plate 1). The SVOC analyte concentrations at SB-18B (18.5-19 ft bls) and SB-20 (17-17.5 ft bls) were relatively the same as reported respectively below:

- benzo(a)anthracene – 28 mg/kg and 28 mg/kg, respectively (compared to 1 mg/kg [UUSCOs and RRSCOs]);
- benzo(a)pyrene – 14 mg/kg and 16 mg/kg (compared to 1 mg/kg [UUSCOs and RRSCOs]);
- benzo(b)fluoranthene – 21 mg/kg and 25 mg/kg (compared to 1 mg/kg [UUSCOs and RRSCOs]);
- benzo(k)fluoranthene – 8.9 mg/kg and 9.5 mg/kg (compared to 0.8 mg/kg UUSCOs, and 3.9 RRSCOs);
- chrysene – 23 mg/kg and 26 mg/kg (compared to 1 mg/kg UUSCOs, and 3.9 RRSCOs);
- dibenzo(a,h)anthracene – 2.2 mg/kg and 2.3 mg/kg (compared to 0.33 mg/kg [UUSCOs, and RRSCOs]);
- indeno(1,2,3-cd)pyrene – 6 mg/kg and 6.4 mg/kg (compared to 0.5 mg/kg [UUSCOs, and RRSCOs]); and
- naphthalene – 12 mg/kg at SB-18B (compared to 12 mg/kg UUSCOs).

2.3.1.2 LBA RI Groundwater Conditions

Temporary groundwater monitoring wells TWP01 through TWP04 were installed at basement boring locations SB-05B, SB-08, SB-10 and SB-12, respectively. TPH concentrations in groundwater ranged from 2,700 micrograms per liter (µg/L) in TWP03 to 6,500 µg/L in TWP04. VOCs were detected in groundwater at all four locations at concentrations above the AWQSGVs (refer to Figure 4). The only SVOC detected in groundwater at a concentration above the AWQSGVs was naphthalene at a concentration of 12 µg/L in sample TWP03.

2.3.2 Groundwater Monitoring and Remediation Report Fourth Quarter 2016 (URS, 2017)

URS, on behalf of New York City Administration for Children's Services (NYCACS), implemented a monthly separate phase petroleum product recovery program in September 2014 and quarterly groundwater sampling. An estimated 11.75 gallons of product was recovered between September 2014 and October 2016. Separate phase petroleum product was initially recovered using a peristaltic pump and by June 2015, the separate phase petroleum product thickness in the monitoring wells had decreased substantially enough to switch to using petroleum absorbent socks in monitoring wells MW-02, MW-03, MW-04, and MW-05 for recovery. However, due to the amount of separate phase petroleum product present at monitoring well MW-05 manual product recovery with a pump resumed in November 2015. From May through August 2016, no separate phase petroleum product was detected in this well but in October 2016, product was measured at a thickness of 0.05 feet.

Separate phase petroleum product was detected at monitoring well MW-06 in February 2016 and was detected monthly thereafter. A petroleum absorbent sock was installed in MW-06 in April 2016 and replaced monthly. During the October 2016 monitoring event product was not detected at MW-06.

Due to the continued presence of separate phase petroleum product in monitoring wells MW-02, MW-03, MW-04, and MW-05, groundwater has not been sampled from these monitoring wells. Groundwater sampling has occurred quarterly at MW-01, during the most recent sampling round in October 2016, the following analytes were present at concentrations above the AWQSGVs:

- Benzene 3.3 µg/L (compared to 1 µg/L AWQSGVs);
- Ethylbenzene 67.9 µg/L (compared to 5 µg/L AWQSGVs);
- Total Xylenes 79.7 µg/L (compared to 5 µg/L AWQSGVs);
- Isopropylbenzene 17.2 µg/L (compared to 5 µg/L AWQSGVs);
- n-Propylbenzene 30.1 µg/L (compared to 5 µg/L AWQSGVs);
- p-Isopropyltoluene 9.1 µg/L (compared to 5 µg/L AWQSGVs);
- 1,2,4–Trimethylbenzene 313 µg/L (compared to 5 µg/L AWQSGVs);
- 1,3,5- Trimethylbenzene 70 µg/L (compared to 5 µg/L AWQSGVs);
- n-Butylbenzene 12.2 µg/L (compared to 5 µg/L AWQSGVs); and
- Naphthalene 112 µg/L (compared to 10 µg/L AWQSGVs).

Monitoring Well MW-06 was also sampled for VOCs and SVOCs in 2016 when separate phase petroleum product was not present (January and October 2016). Neither VOCs or SVOCs were not detected above reporting limits during the sampling events, with exception of one SVOC, Naphthalene, which was detected

at a concentration of 36 µg/L, above the AWQSGV of 10 µg/L during the January 2016 sampling event. Chlorinated VOCs (CVOCs) were not analyzed in groundwater.

2.3.3 Roux Associates Phase I ESA (2017)

Roux Associates completed a Phase I ESA in 2017, as part of the ESA, the following environmental concerns were identified:

- Documented petroleum contamination in soil and groundwater as a result of the fuel oil release from UST supply lines located near the basement boiler room of the Spofford Juvenile Detention Center. Based on information reviewed by Roux Associates, it was assumed that separate phase petroleum product and extensive soil contamination still exists at the Site. The impacts to soil, groundwater and, potentially soil vapor, beneath the Site is considered a REC in relation to the Site.
- The following table summarized findings from NYSDEC Petroleum Bulk Storage (PBS) Records for the Site, which is currently registered under PBS#2-604085.

Tank ID	Tank Location	Tank Contents	Capacity (Gal)	Status
001	Underground	#6 Fuel Oil	20,000	Closed-Removed 2002
002	Underground	#2 Fuel Oil	12,000	In Service
003	Underground	#2 Fuel Oil	12,000	In Service
Diesel	Aboveground (in vault)	Diesel (generator)	5,000	Closed in Place 2002
Heat	Aboveground (in vault)	Closed – Removed	20,000	Closed in Place 2002

- Staining: Staining observed on the concrete basement floor was presumably associated with oil spills and cleanup materials, and other universal wastes (such as batteries) or degreasers, electrical equipment, and lubricating oils). Staining on the concrete basement floor; and is considered a REC in relation to the Site given the presence of floor drains and other penetrations in the concrete.
- Historical Uses: The Site was occupied by a laundry facility, stone cutting yard and an asphalt paving contractor prior to being developed as a juvenile detention center. It is possible that potential undocumented releases from the operations may have impacted the subsurface at the Site. The threat of potential impacts to soil, groundwater and, soil vapor, beneath the Site is considered a REC in relation to the Site.

2.3.4 Roux Associates Phase II ESA (2017)

In 2017, Roux Associates completed a Phase II ESA for the Site. This investigation consisted of 6 soil borings with 12 soil samples, one sub-slab soil gas sample, and two soil vapor samples. Groundwater was not collected as part of this assessment. The results of the Phase II ESA and Roux Associates' conclusions related to environmental conditions at the Site are summarized in the soil, groundwater and soil vapor sections below.

2.3.4.1 Soil Conditions

Previous investigations indicated the presence of petroleum-related VOCs in soils at concentrations above UUSCOs, RRSCOs and/or Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) associated with

releases from former tank systems and/or other Site uses. Site soils have not been remediated since completion of prior investigations.

These soil exceedances above criteria represented reasonable Site use and were confirmed by the Roux Associates' Phase II ESA. Several petroleum-related and historic fill-related SVOCs were detected in shallow soil (i.e., 0-2 ft bls) at concentrations above the UUSCOs, RRSCOs and/or PGWSCOs. Arsenic was detected in soil at a concentration above UUSCOs, RRSCOs and PGWSCOs from one same. Copper, lead and zinc were detected in soil at concentrations above UUSCOs but below RRSCO and PGWSCOs.

Volatile Organic Compounds (VOCs) - Table 2 presents a summary of the VOC analytical data for soil samples collected during the Phase II ESA. As shown, there were no VOC detections above NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs), and Restricted Residential Use SCOs (RRSCOs).

Semivolatile Organic Compounds (SVOCs) - Table 3 presents a summary of SVOC analytical data collected during the Phase II ESA. As shown, six SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and/or indeno(1,2,3-c,d)pyrene) were detected in three of the 19 samples, including the duplicate sample, at concentrations exceeding UUSCOs, and/or RRSCOs. Laboratory analytical data for the SVOC soil exceedances are summarized below.

- Benzo(a)anthracene was detected in samples RXSB-4 (0-2), and RXSB-6 (0-2) at a concentration of 4 mg/kg, and 1.5 mg/kg, respectively (compared to 1 mg/kg [UUSCOs, and RRSCOs]).
- Benzo(a)pyrene was detected in samples RXSB-4 (0-2) at a concentration of 3.500 mg/kg (compared to 1 mg/kg [UUSCOs and RRSCOs]).
- Benzo(b)fluoranthene was detected in samples RXSB-4 (0-2) at a concentration of 4.8 mg/kg (compared to 1 mg/kg [UUSCOs, and RRSCOs]). Benzo(b)fluoranthene was detected in sample RXSB-6 (0-2) at a concentration of 1.4 mg/kg (compared to 1 mg/kg [UUSCOs and RRSCOs]).
- Benzo(k)fluoranthene was detected in samples RXSB-4 (0-2) at a concentration of 1.5 mg/kg (compared to 0.8 mg/kg [UUSCOs].
- Chrysene was detected in samples RXSB-4 (0-2), and RXSB-6 (0-2) at a concentration of 3.5 mg/kg, and 1.3 mg/kg, respectively (compared to 1 mg/kg [UUSCOs]).
- Dibenzo(a,h)anthracene was detected in samples RXSB-4 (0-2) at a concentration of 0.580 mg/kg (compared to 0.330 mg/kg [UUSCOs]).
- Indeno(1,2,3-c,d)pyrene was detected in samples RXSB-4 (0-2), and RXSB-6 (0-2) at a concentration of 2.5 mg/kg, and 0.580 mg/kg, respectively (compared to 0.500 mg/kg [UUSCOs and RRSCOs]).

Metals – Table 4 presents a summary of metals analytical data collected during the Phase II ESA. As shown, four metals (arsenic, copper, lead and/or zinc) were detected in six of the 19 soil samples, including the duplicate sample, at concentrations exceeding UUSCOs, RRSCOs and/or PGWSCOs. Laboratory analytical data for soil exceedances for metals are summarized below.

- Arsenic was detecting in sample RXSB-3 (0-2) at a concentration of 18 mg/kg (compared to 13 mg/kg [UUSCOs] and 16 mg/kg [RRSCOs]).
- Copper was detected in samples RXSB-3 (0-2), RXSB-6 (0-2) and RXSB-6 (8-10) at a concentration of 64 mg/kg, 190 mg/kg and to 72 mg/kg, respectively (compared to 50 mg/kg [UUSCOs]).
- Lead was detected in samples RXSB-4 (0-2) and RXSB-6 (0-2) at a concentration of 64 mg/kg and 150 mg/kg, respectively (compared to 63 mg/kg [UUSCOs]).

- Zinc was detected in samples RXSB-3 (0-2), RXSB-4 (0-2), RXSB 5 (0-2), RXSB-6 (0-2) and RXSB-6 (8-10) at concentrations ranging from 120 mg/kg to 1200 mg/kg (compared to 109 mg/kg [UUSCOs]).

Polychlorinated biphenyls (PCBs) – Table 5 presents a summary of PCB analytical data collected during the Phase II ESA. As shown, PCBs were not detected at concentration exceeding UUSCOs, or RRSCOs during the Phase II ESA.

Pesticides – Table 6 presents a summary of pesticides analytical data collected during the Phase II ESA. As shown, three pesticides (DDD, DDE and/or DDT) were detected in three of the 19 samples, including the duplicate sample, at concentrations exceeding UUSCOs only. Laboratory analytical data for the soil exceedances for pesticides are summarized below.

- DDD was detected in samples RXSB-4 (0-2) Duplicate and RXSB-5 (5-6) at a concentration of 0.00457 mg/kg and 0.0616 mg/kg, respectively (compared to 0.0033 mg/kg [UUSCOs]).
- DDE was detected in sample RXSB-5 (5-6) at a concentration of 0.0766 mg/kg (compared to 0.0033 mg/kg [UUSCOs]).
- DDT was detected in samples RXSB-5 (5-6) at a concentration of 0.513 mg/kg (compared to 0.0033 mg/kg [UUSCOs]).

2.3.4.2 Soil Vapor Conditions

Several petroleum-related VOCs and chlorinated VOCs were detected in soil vapor samples throughout the Site. Specifically, three petroleum-related VOCs were detected at elevated concentrations in the sub-slab soil gas sample (RXSS-1): benzene detected at a concentration of 377 µg/m^3), cyclohexane detected at a concentration of 20,200 µg/m^3, and propylene detected at a concentration of 181 µg/m^3. The source of the petroleum-related VOCs is likely attributed to the 2009 #2 fuel oil spill and/or other historic spills.

One sample location (RXSV-2) contained concentrations of Trichloroethylene (TCE) (1.75 µg/m3) in soil vapor that exceeded the New York State Department of Health Center for Environmental Health Bureau of Environmental Exposure Investigation (NYSDOH CEH BEEI) Soil Vapor Intrusion Guidance Matrices of May 2017. Assuming no attenuation and therefore assuming the same soil vapor concentration for the indoor air concentration, the matrix indicates the recommended action to mitigate.

3. RI Work Plan Objectives, Scope and Rationale

The Requestor has developed a RI scope of work (presented in this RIWP) that is intended to satisfy NYSDEC BCP requirements.

Standards, Criteria and Guidance (SCGs) for soil at BCP Sites are the numerical SCOs presented in Part 375. The SCOs are categorized into unrestricted use criteria and restricted use (residential, restricted-residential, commercial, or industrial) criteria, as well as criteria for protection of groundwater (PGW) and ecological resources (which can also be satisfied by application of the unrestricted use criteria). The applicability of each category of SCOs is determined based upon the current and reasonably anticipated future use of the Site, as well as cleanup tracks being evaluated. The UUSCOs and RRSCOs are potentially applicable and appropriate criteria for the Site. Data collected during the RI will determine the potential remedial actions for the Site.

3.1 Objectives

Previous investigations have documented the presence of the following known areas of impacts and potential historical areas of concern (AOs):

- Impacts due to the fuel oil release from USTs;
- Potential dissolved petroleum contamination in groundwater located within shallow bedrock;
- SVOCs in soil;
- Metals in soil; and
- VOCs in soil gas and sub-slab soil gas.

Based on the existing database for the Site and known data gaps, the following objectives have been identified for the RIWP:

- Identify historical AOCs (described above);
- Evaluate soil quality associated with the AOCs;
- Delineate the nature and extent of impacted soil, including soil associated with USTs;
- Delineate the nature and extent of impacts to groundwater; and
- Evaluate the soil gas and sub-slab soil gas intrusion risk to future structures that may be built on the Site.

Environmental data collected during the RI will be used to qualitatively assess the potential exposure of receptors to Site contaminants, and develop the information necessary to support the development of a RAWP.

3.2 RI Scope

The scope of the RI will include the collection of sufficient Site characterization data so that, together with the historical data, the entire Site will be sufficiently characterized to support the development of the Site-wide RAWP. To accomplish this, the scope of work for the RI will include the following:

- The completion of a geophysical survey in the courtyards to identify USTs and any major infrastructure at the Site, such as storm drains, sewers, piping, catch basins, etc.;

- The collection of soil, groundwater, and soil vapor data sufficient to define the nature and extent of impacted media;
- The collection of a synoptic round of groundwater level measurements and the collection of additional land survey data as needed for developing a groundwater elevation contour map; and
- The performance of a qualitative exposure assessment to identify exposure pathways, and evaluate contaminant fate and transport.

All work will be performed prior to demolition of the existing Site building. Additional Site characterization will likely be performed following removal of the existing in-service fuel oil USTs. Depending on the timing of the UST removals, the Site characterization would be proposed as part of the component of an Interim Remedial Measure Work Plan, or the Remedial Action Work Plan. All investigation and removal activity will be conducted in accordance with the applicable requirements of Section 5.5 NYSDEC DER-10.

In order to delineate and characterize soil and groundwater quality beneath the Site, all soil and groundwater samples will be analyzed for the full Target Compound List (TCL) plus 30 (10 VOCs and 20 SVOCs) organic compounds, highest concentration tentatively identified compounds (TICs), Target Analyte List (TAL) metals, TCL pesticides, and TCL PCBs.

All soil vapor samples will be analyzed using USEPA Method TO-15 for VOCs.

All data will be produced in accordance with NYSDEC ASP Category B deliverables and will be reviewed and validated by an independent party in a Data Usability Summary Report (DUSR) before being incorporated into the RI Report for the Site. All data will be submitted to NYSDEC in electronic format, in accordance with DER-10, section 1.15.

The overall scope of each component of the RI is discussed in the following subsections. Detailed field sampling procedures are provided in the Field Sampling Plan (FSP) (Appendix A). The proposed sampling locations are shown on Figure 6 of this RIWP and additional information including intervals to be sampled and sample rationale is provided in Tables 8a, 8b and 8c of this RIWP.

3.2.1 Site Reconnaissance

Roux Associates has performed a preliminary Site reconnaissance and has identified AOCs described in Section 3.1. These areas will be targeted during the RI. An inspection of the existing Site conditions will be conducted to determine final locations of soil borings and monitoring wells based on actual field conditions. In addition, the presence and condition of existing monitoring wells will be evaluated and if the existing Site monitoring wells are determined to be in good condition, the existing monitoring wells will be incorporated into the groundwater gauging and sampling program in order to evaluate groundwater flow direction and quality, as described further in Section 3.2.4.

Prior to any subsurface intrusive work, utility markouts will be requested by the contractor and utility clearance for each borehole will be completed by completing a geophysical survey as described in Section 3.2.2, and by soft-digging as more fully described in Section 3.2.3. All field activities will be photo -documented for inclusion in the RI Report.

3.2.2 Geophysical Survey

A geophysical survey will be performed at the Site in an attempt to identify the locations of additional potential USTs, any other potential AOCs, and to perform borehole pre-clearance for proposed RI drilling locations.

Any boring locations that the geophysical survey determines to be near subsurface utilities will be relocated to the safest, closest alternative drilling location that still represents the targeted AOC. The geophysical survey will consist of utilizing ground penetrating radar (GPR) and electromagnetic methods (EM), which both can detect potential USTs and/or utilities within the subsurface. If a sample point is proposed to be moved more than 10 feet from the location shown on Figure 6, the NYSDEC project manager will be consulted prior to beginning work at the new location. Additional investigation may be proposed in accordance with NYSDEC DER-10 based on the findings of the geophysical investigation.

3.2.3 Soil Investigation

To characterize the soil conditions for the various AOCs at the Site, 24 soil borings will be installed at the locations shown in Figure 6. Boreholes will be pre-cleared to five feet below land surface using non-intrusive methods such as hand tools and vacuum excavation prior to advancement of soil borings and monitoring wells pilot boreholes to verify the absence of utilities and/or other subsurface features (i.e., obstructions and/or utilities). Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no more than 10 feet away from the original proposed sample location. If a boring is proposed to be moved more than 10 feet from the location shown on Figure 6, the NYSDEC project manager will be consulted prior to installing the boring at the new location. Soil samples will be collected by utilizing both the GeoProbe® Direct-Push Drill Rig or the Sonic Drill Rig. Soil borings will be completed to a maximum depth of up to five feet into bedrock. Soil samples will be collected continuously from land surface to the top of competent bedrock, as shown below and in Table 8a. During installation of the soil borings, the lithology will be recorded and soil will be visually inspected for evidence (visual or olfactory) of contamination and field screened continuously for VOCs using a PID with a 10.6 eV lamp.

Soil borings will be advanced to characterize soil in the following locations at the Site. Roux Associates proposes the following sampling scheme:

Location	Depth Intervals (ft bls)	Maximum Depth	Analyses	Rationale
Monitoring Well pilot borehole (RXMW-1, RXMW-2, RXMW-6, and RXMW-7)	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL* (see Note below table)	To evaluate soil quality in shallow soil and at the water table at the Site boundary.
RXSB-15	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock	TCL+30/TAL	To evaluate potential impacts from the historic petroleum release and to evaluate current soil quality.
Monitoring Well pilot borehole (RXMW-3, RXMW-4, and RXMW-5)	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL	To evaluate soil quality in shallow soil and to evaluate potential impacts from the historic petroleum release. To evaluate current soil quality at the water table.

Location	Depth Intervals (ft bls)	Maximum Depth	Analyses	Rationale
Monitoring Well pilot borehole (RXMW-9, RXMW-10 and RXMW-11) Temporary Monitoring Well pilot borehole (RXTGW-12)	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-11, RXSB-12, RXSB-13, RXSB-14, and RXSB-17	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock	TCL+30/TAL	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-16 and RXMW-8	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL	To evaluate potential impacts from the historic laundry facility. To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-3A, RXSB-3AN, RXSB-3AE, RXSB-3AS, and RXSB-3AW	0-2 foot interval, 2-4 foot interval, and 4-6 foot interval	6 feet	TAL Metals	To evaluate soil quality in shallow soil.

* Note: Target Compound List (TCL) plus 30/ Target Analyte List (TAL) (TCL + 30/TAL) includes:
  - TCL VOC + Tentatively identified compounds (ID TICS);
  - TCL Base neutral acids (BNA)/SVOCs + 20;
  - TCL Pesticides;
  - TCL Herbicides;
  - TCL PCBs;
  - TAL Metals (including hexavalent chromium); and
  - Total Cyanide.

Following sample collection, boreholes will be backfilled with soil cuttings with an upper bentonite plug and restored to match the surrounding grade with “in kind” materials (e.g. asphalt, soil, concrete) to surrounding conditions. Contaminated soil cuttings will be places in sealed and labeled DOT-approved 55-gallon drums pending characterization and off-site disposal at a permitted facility.

If odor/ visual evidence of contamination or elevated photoionization detector (PID) concentrations are noted, one additional sample will be collected from the interval that exhibits the greatest evidence of contamination.

3.2.4 Groundwater Investigation

To characterize onsite groundwater flow and quality conditions, a combination of permanent and temporary groundwater monitoring wells will be installed across the Site and existing monitoring wells will be sampled. The proposed groundwater monitoring well locations are shown on Figure 6.

Eleven permanent groundwater monitoring wells (RXMW-1 through RXMW-11) and one temporary groundwater monitoring well (RXTGW-12) will be installed to varying depths, depending on the depth of where bedrock is encountered, across the Site. All wells will be installed bridging the water table. The permanent groundwater monitoring wells will be drilled into bedrock and the temporary groundwater monitoring well will be drilled to a maximum depth where the top of bedrock is encountered. The six existing monitoring wells (MW-01 through MW-06) will also be sampled if determined to be in good condition during the Site reconnaissance.

Following installation, each monitoring well proposed to be sampled (new and existing) will be developed to ensure proper hydraulic connection with the aquifer and to reduce/eliminate turbidity of the groundwater. The wells will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has turbidity below 50 nephelometric turbidity units (NTUs), if possible. Detailed procedures regarding well development in the FSP (Appendix A). All monitoring wells will be surveyed by a surveyor licensed in the State of New York to obtain horizontal and vertical coordinates. The depth to groundwater and any separate phase petroleum product (if present) in each well will be measured using an interface probe, and a groundwater contour map will be developed using the survey data. The FSP in Appendix A contains monitoring well design details.

Following well development, one round of groundwater samples will be collected in accordance with the FSP from the monitoring wells that do not have separate phase petroleum product and analyzed for:

- TCL + 30/TAL; and
- All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs.

Additionally, three monitoring wells representative of the Site conditions (RXMW-2, RXMW-4, and RXMW-7) will be sampled for 1,4-dioxane, perfluorinated Compounds (PFCs). If separate phase petroleum product is encountered during the RI, up to two product samples will be collected for fingerprint analysis.

Field parameters (e.g., pH, dissolved oxygen, ORP, etc.) will also be collected using a water quality meter during purging and prior to sampling.

3.2.5 Soil Vapor Investigation

Soil vapor samples (RXSV-4 through RXSV-14) and sub-slab samples (RXSS-2 through RXSS-5) will be collected during the RI to evaluate soil vapor conditions at the Site. All soil vapor samples will be collected in accordance with the October 2006 New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance). All soil vapor samples will be collected approximately two feet above the water table.

Eleven soil vapor samples (RXSV-4 through RXSV-14) will be collected from temporary soil vapor points from borings installed using a Geoprobe®. New Teflon®-lined tubing will be attached to an expendable soil vapor sampling point with a 6-inch stainless steel screen inside the rods, to prevent infiltration of ambient air. The soil vapor points will be backfilled with #2 Morie sand to approximately one foot above the screen. The remainder of the borehole will be backfilled with a concrete/bentonite slurry to grade.

Four sub-slab vapor samples (RXSS-2 through RXSS-5) will be collected from temporary sub-slab vapor points constructed of Teflon®-lined tubing attached to 6-inch stainless steel screens installed directly beneath

the existing floor slab. Each location will be sealed with a bentonite slurry to prevent infiltration of ambient air.

All soil vapor samples will be collected using pre-cleaned 2.7-liter summa canisters with regulators calibrated to collect samples over a 2-hour period and analyzed using USEPA Method TO-15 for VOCs. A helium tracer gas test will be performed on each vapor point prior to sampling in accordance with the procedures outlined in the NYSDOH Guidance. The proposed soil vapor sampling locations are shown on Figure 6.

Additional details regarding soil vapor sampling methods are provided in the FSP (Appendix A).

3.2.6 Investigation Derived Waste

All investigation derived waste (e.g., soil cuttings, purge water, disposable sampling equipment) will be containerized in drums for proper characterization and off-site disposal in accordance with the procedures identified in Section 6.2 of the FSP.

3.2.7 Qualitative Exposure Assessment

A qualitative human health exposure assessment (EA) will be performed following the collection of all RI data. The EA will be performed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a qualitative EA (NYSDEC DER-10; Appendix 3 B). The results of the qualitative EA will be provided in the RI report.

According to Section 3.10 of DER-10, and the Fish and Wildlife Resources Impact Analysis Decision Key in DER-10 Appendix 3C, a Fish and Wildlife exposure assessment is not applicable and will not be prepared for this Site. There are no ecological resources identified within ½ mile of the Site and the lack of resources is not due to contamination, historical Sanborn maps (dating back to 1924) and aerial photos (dating back to 1896) do not indicate the previous presence of ecological resources. The Site does not contain habitat for an endangered, threatened or special concern species.

4. Quality Assurance/ Quality Control (QA/QC) Protocols

The goal of the QA/QC aspect of the RI is to ensure that suitable and verifiable data results from sampling and analysis performed. To accomplish this, a QAPP has been prepared and is provided as Appendix B. The data generated by the Roux Associates RI for the Site will be produced in accordance with NYSDEC ASP Category B deliverables. All data generated by the Roux Associates RI will be reviewed and validated by an independent party in a DUSR in accordance with DER-10 Appendix 2B (2) before being incorporated into the RIR for the Site.

5. Health and Safety

A site-specific Health and Safety (H&S) Plan has been prepared for the Site and is provided in Appendix C. A site-specific Community Air Monitoring Plan (CAMP) has been prepared for the Site and is provided in Appendix D.

6. Reporting and Schedule

The following will be provided to the NYSDEC during the course of the RI work.

Progress Reports

Progress report submittals to be provided to the NYSDEC include the following.

1) Periodic reports, no less than one per month as required by the BCA, will be submitted no later than the tenth day of each month during RI activities.
2) Discovery of any previously unknown contaminated media and/or USTs during RI activities will be promptly communicated to NYSDEC's project manager.
3) A Site map will be provided to identify locations discussed in progress reports provided to NYSDEC.

RI Report and Remedial Action Work Plan

Following the completion of the RI, a RI report (RIR) will be prepared to summarize the results and findings of the RI. The Remedial Action Work Plan (RAWP) will be prepared after NYSDEC completes their review of the RIR.

The RIR and RAWP will include all data developed during the RI, and will meet the technical requirements of the NYSDEC DER-10. A summary of the RIR components and description that will be provided follows below:

- Site Setting, surrounding property descriptions, redevelopment plans;
- Remedial Investigation;
  - Soil, groundwater and soil vapor investigation activities;
  - Site history, past investigations and remediation;
  - Geological conditions;
  - Contamination Conditions:
    - Conceptual Site Model;
    - Areas of Concern;
    - Soil, groundwater and soil vapor contamination;
- Environmental and Public Health Assessments;
- Remedial Action Objectives; and
- Conclusions and Recommendations.

Remedial Investigation Schedule		
Remedial Investigation Work Plan (RIWP) Public Comment Period	October 2017	Allow 45 days for public comment on draft, comment period to conclude in October 2017.
Submittal of RIWP to NYSDEC	July 2017	
Resubmittal of RIWP to NYSDEC	December 2017	
BCA Executed	December 2017	

Remedial Investigation Schedule		
Resubmittal of RIWP to NYSDEC	January 2018	
Resubmittal of RIWP to NYSDEC	February 2018	
NYSDEC Approval of RIWP	February 2018	
Remedial Investigation	February 2018	Anticipated 3 weeks to complete RI activities.
Submit RIR to NYSDEC	March 2018	
NYSDEC and NYSDOH Review and	March to April 2018	30-day calendar review
NYSDEC and NYSDOH Approval of RIR	March 2018	
Mail Fact Sheet to Site Contact List	May 2018	One week after final approval of RIR

7. References

Arcadis. 2016 Phase I Environmental Site Assessment, 1221 Spofford Avenue, Bronx, New York. June 3, 2016.

Louis Berger & Assoc., P.C. 2009. Final Remedial Investigation Report, Bridges Juvenile Justice Center, 1221 Spofford Avenue, Bronx, New York. May 15, 2009.

Louis Berger & Assoc., P.C. 2010. Remedial Action Plan, Bridges Juvenile Justice Center, 1221 Spofford Avenue, Bronx, New York. May 21, 2010.

Roux Associates, Inc. 2017a. Phase I Environmental Site Assessment, 1221 Spofford Avenue, Bronx, New York. July 11, 2017.

Roux Associates, Inc. 2017b. Phase II Environmental Site Assessment, 1221 Spofford Avenue, Bronx, New York. August 10, 2017.

URS. 2017. Groundwater Monitoring and Remediation Report for the Fourth Quarter 2016, NYCDDC UST Program, Bridges Juvenile Justice Center, 1221 Spofford Avenue, Bronx, New York. January 25, 2017.

TABLES

1. Groundwater Monitoring Well Gauging Table
2. Summary of Volatile Organic Compounds in Soil
3. Summary of Semivolatile Organic Compounds in Soil Samples
4. Summary of Metals in Soil
5. Summary of Polychlorinated Biphenyl Compounds in Soil
6. Summary of Pesticides in Soil
7. Summary of Volatile Organic Compounds in Sub-Slab and Soil Vapor
8. a. Proposed Soil Sampling Locations
   b. Proposed Groundwater Sampling Locations
   c. Proposed Soil Vapor Sampling Locations

Table 1. Groundwater Monitoring Well Gauging Table
1221 Spofford Avenue, Bronx, New York

Existing Well Designation	Date	Well Diameter (in)	DTW (ft bls)	DTP (ft bls)	DTB (ft bls)	Comments
MW-1	**4/26/2017**	2	11.99	--	23.31	
MW-2	**4/26/2017**	2	13.50	13.49	24.83	absorbent in well
MW-3	**4/26/2017**	2	16.75	16.74	27.43	absorbent in well
MW-4	**4/26/2017**	2	18.49	--	28.03	absorbent in well
MW-5	**4/26/2017**	2	1.08	0.85	13.12	absorbent in well
MW-6	**4/26/2017**	2	1.15	--	13.10	

in - Inches
ft bls - Feet below land surface

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-1	RXSB-1	RXSB-2	RXSB-2
			Sample Date:		04/24/2017	04/25/2017	04/24/2017	04/25/2017
			Sample Depth (ft bls):		0 - 2	8 - 10	0 - 2	7 - 9
			Normal or Field Duplicate:		N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
1,1,1,2-Tetrachloroethane	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
1,1,1-Trichloroethane	680	100000	680	UG/KG	1 U	1 U	1.1 U	1 U
1,1,2,2-Tetrachloroethane	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
1,1,2-Trichloroethane	--	--	--	UG/KG	1.5 U	1.5 U	1.6 U	1.6 U
1,1-Dichloroethane	270	26000	270	UG/KG	1.5 U	1.5 U	1.6 U	1.6 U
1,1-Dichloroethene	330	100000	330	UG/KG	1 U	1 U	1.1 U	1 U
1,1-Dichloropropene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,2,3-Trichlorobenzene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,2,3-Trichloropropane	--	--	--	UG/KG	10 U	10 U	11 U	10 U
1,2,4,5-Tetramethylbenzene	--	--	--	UG/KG	4.1 U	4.1 U	4.4 U	4.2 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,2,4-Trimethylbenzene	3600	52000	3600	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,2-Dibromo-3-Chloropropane	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	--	UG/KG	4.1 U	4.1 U	4.4 U	4.2 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,2-Dichloroethane	20	3100	20	UG/KG	1 U	1 U	1.1 U	1 U
1,2-Dichloropropane	--	--	--	UG/KG	3.6 U	3.6 U	3.8 U	3.7 U
1,3,5-Trimethylbenzene (Mesitylene)	8400	52000	8400	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,3-Dichloropropane	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
1,4-Diethyl Benzene	--	--	--	UG/KG	4.1 U	4.1 U	4.4 U	4.2 U
1,4-Dioxane (P-Dioxane)	100	13000	100	UG/KG	41 U	41 U	44 U	42 U
2,2-Dichloropropane	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
2-Chlorotoluene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
2-Hexanone	--	--	--	UG/KG	10 U	10 U	11 U	10 U
4-Chlorotoluene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
4-Ethyltoluene	--	--	--	UG/KG	4.1 U	4.1 U	4.4 U	4.2 U
Acetone	50	100000	50	UG/KG	3.5 J	2.9 J	7.4 J	10 U

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-1	RXSB-1	RXSB-2	RXSB-2
				Sample Date:	04/24/2017	04/25/2017	04/24/2017	04/25/2017
				Sample Depth (ft bls):	0 - 2	8 - 10	0 - 2	7 - 9
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Acrylonitrile	--	--	--	UG/KG	10 U	10 U	11 U	10 U
Benzene	60	4800	60	UG/KG	1 U	1 U	1.1 U	1 U
Bromobenzene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Bromochloromethane	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Bromodichloromethane	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Bromoform	--	--	--	UG/KG	4.1 U	4.1 U	4.4 U	4.2 U
Bromomethane	--	--	--	UG/KG	2 U	2 U	2.2 U	2.1 U
Carbon Disulfide	--	--	--	UG/KG	10 U	10 U	11 U	10 U
Carbon Tetrachloride	760	2400	760	UG/KG	1 U	1 U	1.1 U	1 U
Chlorobenzene	1100	100000	1100	UG/KG	1 U	1 U	1.1 U	1 U
Chloroethane	--	--	--	UG/KG	2 U	2 U	2.2 U	2.1 U
Chloroform	370	49000	370	UG/KG	1.5 U	1.5 U	1.6 U	1.6 U
Chloromethane	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Cis-1,2-Dichloroethylene	250	100000	250	UG/KG	1 U	1 U	1.1 U	1 U
Cis-1,3-Dichloropropene	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Cymene	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Dibromochloromethane	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Dibromomethane	--	--	--	UG/KG	10 U	10 U	11 U	10 U
Dichlorodifluoromethane	--	--	--	UG/KG	10 U	10 U	11 U	10 U
Dichloroethylenes	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Diethyl Ether (Ethyl Ether)	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Ethylbenzene	1000	41000	1000	UG/KG	1 U	1 U	1.1 U	1 U
Hexachlorobutadiene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Isopropylbenzene (Cumene)	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
m,p-Xylene	--	--	--	UG/KG	2 U	2 U	2.2 U	2.1 U
Methyl Ethyl Ketone (2-Butanone)	120	100000	120	UG/KG	10 U	10 U	11 U	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	--	UG/KG	10 U	10 U	11 U	10 U
Methylene Chloride	50	100000	50	UG/KG	10 U	10 U	11 U	10 U
Naphthalene	12000	100000	12000	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-1	RXSB-1	RXSB-2	RXSB-2
			Sample Date:		04/24/2017	04/25/2017	04/24/2017	04/25/2017
			Sample Depth (ft bls):		0 - 2	8 - 10	0 - 2	7 - 9
			Normal or Field Duplicate:		N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
N-Butylbenzene	12000	100000	12000	UG/KG	1 U	1 U	1.1 U	1 U
N-Propylbenzene	3900	100000	3900	UG/KG	1 U	1 U	1.1 U	1 U
O-Xylene (1,2-Dimethylbenzene)	--	--	--	UG/KG	2 U	2 U	2.2 U	2.1 U
Sec-Butylbenzene	11000	100000	11000	UG/KG	1 U	1 U	1.1 U	1 U
Styrene	--	--	--	UG/KG	2 U	2 U	2.2 U	2.1 U
T-Butylbenzene	5900	100000	5900	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Tert-Butyl Methyl Ether	930	100000	930	UG/KG	2 U	2 U	2.2 U	2.1 U
Tetrachloroethylene (PCE)	1300	19000	1300	UG/KG	0.7 J	1 U	1.1 U	1 U
Toluene	700	100000	700	UG/KG	1.5 U	1.5 U	1.6 U	1.6 U
Total, 1,3-Dichloropropene (Cis And Trans)	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Trans-1,2-Dichloroethene	190	100000	190	UG/KG	1.5 U	1.5 U	1.6 U	1.6 U
Trans-1,3-Dichloropropene	--	--	--	UG/KG	1 U	1 U	1.1 U	1 U
Trans-1,4-Dichloro-2-Butene	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Trichloroethylene (TCE)	470	21000	470	UG/KG	1 U	1 U	1.1 U	1 U
Trichlorofluoromethane	--	--	--	UG/KG	5.1 U	5.1 U	5.4 U	5.2 U
Vinyl Acetate	--	--	--	UG/KG	10 U	10 U	11 U	10 U
Vinyl Chloride	20	900	20	UG/KG	2 U	2 U	2.2 U	2.1 U
Xylenes	260	100000	1600	UG/KG	2 U	2 U	2.2 U	2.1 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-3	RXSB-3	RXSB-4	RXSB-4
			Sample Date:		04/25/2017	04/26/2017	04/24/2017	04/24/2017
			Sample Depth (ft bls):		0 - 2	6 - 8	0 - 2	0 - 2
			Normal or Field Duplicate:		N	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
1,1,1,2-Tetrachloroethane	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
1,1,1-Trichloroethane	680	100000	680	UG/KG	1.3 U	1 U	1 U	0.9 U
1,1,2,2-Tetrachloroethane	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
1,1,2-Trichloroethane	--	--	--	UG/KG	1.9 U	1.5 U	1.6 U	1.3 U
1,1-Dichloroethane	270	26000	270	UG/KG	1.9 U	1.5 U	1.6 U	1.3 U
1,1-Dichloroethene	330	100000	330	UG/KG	1.3 U	1 U	1 U	0.9 U
1,1-Dichloropropene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,2,3-Trichlorobenzene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,2,3-Trichloropropane	--	--	--	UG/KG	13 U	10 U	10 U	9 U
1,2,4,5-Tetramethylbenzene	--	--	--	UG/KG	5.1 U	4 U	1.2 J	1 J
1,2,4-Trichlorobenzene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,2,4-Trimethylbenzene	3600	52000	3600	UG/KG	6.3 U	5 U	5.4	3.9 J
1,2-Dibromo-3-Chloropropane	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	--	UG/KG	5.1 U	4 U	4.2 U	3.6 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,2-Dichloroethane	20	3100	20	UG/KG	1.3 U	1 U	1 U	0.9 U
1,2-Dichloropropane	--	--	--	UG/KG	4.4 U	3.5 U	3.7 U	3.1 U
1,3,5-Trimethylbenzene (Mesitylene)	8400	52000	8400	UG/KG	6.3 U	5 U	2.4 J	1.9 J
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,3-Dichloropropane	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	6.3 U	5 U	5.3 U	4.5 U
1,4-Diethyl Benzene	--	--	--	UG/KG	5.1 U	4 U	7.8	6.4
1,4-Dioxane (P-Dioxane)	100	13000	100	UG/KG	51 U	40 U	42 U	36 U
2,2-Dichloropropane	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
2-Chlorotoluene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
2-Hexanone	--	--	--	UG/KG	13 U	10 U	10 U	9 U
4-Chlorotoluene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
4-Ethyltoluene	--	--	--	UG/KG	5.1 U	4 U	2 J	1.4 J
Acetone	50	100000	50	UG/KG	44	10 U	12	4.4 J

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-3	RXSB-3	RXSB-4	RXSB-4
				Sample Date:	04/25/2017	04/26/2017	04/24/2017	04/24/2017
				Sample Depth (ft bls):	0 - 2	6 - 8	0 - 2	0 - 2
				Normal or Field Duplicate:	N	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Acrylonitrile	--	--	--	UG/KG	13 U	10 U	10 U	9 U
Benzene	60	4800	60	UG/KG	1.3 U	1 U	1 U	0.9 U
Bromobenzene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Bromochloromethane	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Bromodichloromethane	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
Bromoform	--	--	--	UG/KG	5.1 U	4 U	4.2 U	3.6 U
Bromomethane	--	--	--	UG/KG	2.5 U	2 U	2.1 U	1.8 U
Carbon Disulfide	--	--	--	UG/KG	13 U	10 U	10 U	9 U
Carbon Tetrachloride	760	2400	760	UG/KG	1.3 U	1 U	1 U	0.9 U
Chlorobenzene	1100	100000	1100	UG/KG	1.3 U	1 U	1 U	0.9 U
Chloroethane	--	--	--	UG/KG	2.5 U	2 U	2.1 U	1.8 U
Chloroform	370	49000	370	UG/KG	1.9 U	1.5 U	1.6 U	1.3 U
Chloromethane	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Cis-1,2-Dichloroethylene	250	100000	250	UG/KG	1.3 U	1 U	1 U	0.9 U
Cis-1,3-Dichloropropene	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
Cymene	--	--	--	UG/KG	1.3 U	1 U	0.52 J	0.44 J
Dibromochloromethane	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
Dibromomethane	--	--	--	UG/KG	13 U	10 U	10 U	9 U
Dichlorodifluoromethane	--	--	--	UG/KG	13 U	10 U	10 U	9 U
Dichloroethylenes	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
Diethyl Ether (Ethyl Ether)	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Ethylbenzene	1000	41000	1000	UG/KG	1.3 U	1 U	1 U	0.9 U
Hexachlorobutadiene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Isopropylbenzene (Cumene)	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
m,p-Xylene	--	--	--	UG/KG	2.5 U	2 U	2.1 U	1.8 U
Methyl Ethyl Ketone (2-Butanone)	120	100000	120	UG/KG	3.8 J	10 U	10 U	9 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	--	UG/KG	13 U	10 U	10 U	9 U
Methylene Chloride	50	100000	50	UG/KG	13 U	10 U	10 U	9 U
Naphthalene	12000	100000	12000	UG/KG	6.3 U	5 U	12	1.9 J

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-3	RXSB-3	RXSB-4	RXSB-4
			Sample Date:		04/25/2017	04/26/2017	04/24/2017	04/24/2017
			Sample Depth (ft bls):		0 - 2	6 - 8	0 - 2	0 - 2
			Normal or Field Duplicate:		N	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
N-Butylbenzene	12000	100000	12000	UG/KG	1.3 U	1 U	0.33 J	0.3 J
N-Propylbenzene	3900	100000	3900	UG/KG	1.3 U	1 U	1 U	0.19 J
O-Xylene (1,2-Dimethylbenzene)	--	--	--	UG/KG	2.5 U	2 U	0.49 J	1.8 U
Sec-Butylbenzene	11000	100000	11000	UG/KG	1.3 U	1 U	0.61 J	0.56 J
Styrene	--	--	--	UG/KG	2.5 U	2 U	2.1 U	1.8 U
T-Butylbenzene	5900	100000	5900	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Tert-Butyl Methyl Ether	930	100000	930	UG/KG	2.5 U	2 U	2.1 U	1.8 U
Tetrachloroethylene (PCE)	1300	19000	1300	UG/KG	1.3 U	1 U	1 U	0.9 U
Toluene	700	100000	700	UG/KG	1.9 U	1.5 U	1.6 U	1.3 U
Total, 1,3-Dichloropropene (Cis And Trans)	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
Trans-1,2-Dichloroethene	190	100000	190	UG/KG	1.9 U	1.5 U	1.6 U	1.3 U
Trans-1,3-Dichloropropene	--	--	--	UG/KG	1.3 U	1 U	1 U	0.9 U
Trans-1,4-Dichloro-2-Butene	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Trichloroethylene (TCE)	470	21000	470	UG/KG	1.3 U	1 U	1 U	0.9 U
Trichlorofluoromethane	--	--	--	UG/KG	6.3 U	5 U	5.3 U	4.5 U
Vinyl Acetate	--	--	--	UG/KG	13 U	10 U	10 U	9 U
Vinyl Chloride	20	900	20	UG/KG	2.5 U	2 U	2.1 U	1.8 U
Xylenes	260	100000	1600	UG/KG	2.5 U	2 U	0.49 J	1.8 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	RXSB-4	RXSB-5	RXSB-5	RXSB-6
Sample Designation:					RXSB-4	RXSB-5	RXSB-5	RXSB-6
Sample Date:					04/25/2017	04/25/2017	04/26/2017	04/24/2017
Sample Depth (ft bls):					11 - 13	0 - 2	5 - 6	0 - 2
Normal or Field Duplicate:					N	N	N	N
1,1,1,2-Tetrachloroethane	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
1,1,1-Trichloroethane	680	100000	680	UG/KG	1.1 U	0.98 U	0.85 U	1 U
1,1,2,2-Tetrachloroethane	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
1,1,2-Trichloroethane	--	--	--	UG/KG	1.6 U	1.5 U	1.3 U	1.5 U
1,1-Dichloroethane	270	26000	270	UG/KG	1.6 U	1.5 U	1.3 U	1.5 U
1,1-Dichloroethene	330	100000	330	UG/KG	1.1 U	0.98 U	0.85 U	1 U
1,1-Dichloropropene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,2,3-Trichlorobenzene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,2,3-Trichloropropane	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
1,2,4,5-Tetramethylbenzene	--	--	--	UG/KG	4.4 U	3.9 U	3.4 U	4.1 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,2,4-Trimethylbenzene	3600	52000	3600	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,2-Dibromo-3-Chloropropane	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	--	UG/KG	4.4 U	3.9 U	3.4 U	4.1 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,2-Dichloroethane	20	3100	20	UG/KG	1.1 U	0.98 U	0.85 U	1 U
1,2-Dichloropropane	--	--	--	UG/KG	3.8 U	3.4 U	3 U	3.6 U
1,3,5-Trimethylbenzene (Mesitylene)	8400	52000	8400	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,3-Dichloropropane	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
1,4-Diethyl Benzene	--	--	--	UG/KG	4.4 U	3.9 U	3.4 U	4.1 U
1,4-Dioxane (P-Dioxane)	100	13000	100	UG/KG	44 U	39 U	34 U	41 U
2,2-Dichloropropane	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
2-Chlorotoluene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
2-Hexanone	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
4-Chlorotoluene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
4-Ethyltoluene	--	--	--	UG/KG	4.4 U	3.9 U	3.4 U	4.1 U
Acetone	50	100000	50	UG/KG	3.7 J	34	2.7 J	9.6 J

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-4	RXSB-5	RXSB-5	RXSB-6
				Sample Date:	04/25/2017	04/25/2017	04/26/2017	04/24/2017
				Sample Depth (ft bls):	11 - 13	0 - 2	5 - 6	0 - 2
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Acrylonitrile	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
Benzene	60	4800	60	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Bromobenzene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Bromochloromethane	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Bromodichloromethane	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Bromoform	--	--	--	UG/KG	4.4 U	3.9 U	3.4 U	4.1 U
Bromomethane	--	--	--	UG/KG	2.2 U	2 U	1.7 U	2 U
Carbon Disulfide	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
Carbon Tetrachloride	760	2400	760	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Chlorobenzene	1100	100000	1100	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Chloroethane	--	--	--	UG/KG	2.2 U	2 U	1.7 U	2 U
Chloroform	370	49000	370	UG/KG	1.6 U	1.5 U	1.3 U	1.5 U
Chloromethane	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Cis-1,2-Dichloroethylene	250	100000	250	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Cis-1,3-Dichloropropene	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Cymene	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Dibromochloromethane	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Dibromomethane	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
Dichlorodifluoromethane	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
Dichloroethylenes	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Diethyl Ether (Ethyl Ether)	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Ethylbenzene	1000	41000	1000	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Hexachlorobutadiene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Isopropylbenzene (Cumene)	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
m,p-Xylene	--	--	--	UG/KG	2.2 U	2 U	1.7 U	2 U
Methyl Ethyl Ketone (2-Butanone)	120	100000	120	UG/KG	11 U	1.6 J	8.5 U	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
Methylene Chloride	50	100000	50	UG/KG	11 U	9.8 U	8.5 U	10 U
Naphthalene	12000	100000	12000	UG/KG	5.4 U	4.9 U	4.2 U	0.2 J

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-4	RXSB-5	RXSB-5	RXSB-6
			Sample Date:		04/25/2017	04/25/2017	04/26/2017	04/24/2017
			Sample Depth (ft bls):		11 - 13	0 - 2	5 - 6	0 - 2
			Normal or Field Duplicate:		N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
N-Butylbenzene	12000	100000	12000	UG/KG	1.1 U	0.98 U	0.85 U	1 U
N-Propylbenzene	3900	100000	3900	UG/KG	1.1 U	0.98 U	0.85 U	1 U
O-Xylene (1,2-Dimethylbenzene)	--	--	--	UG/KG	2.2 U	2 U	1.7 U	2 U
Sec-Butylbenzene	11000	100000	11000	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Styrene	--	--	--	UG/KG	2.2 U	2 U	1.7 U	2 U
T-Butylbenzene	5900	100000	5900	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Tert-Butyl Methyl Ether	930	100000	930	UG/KG	2.2 U	2 U	1.7 U	2 U
Tetrachloroethylene (PCE)	1300	19000	1300	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Toluene	700	100000	700	UG/KG	1.6 U	1.5 U	1.3 U	1.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Trans-1,2-Dichloroethene	190	100000	190	UG/KG	1.6 U	1.5 U	1.3 U	1.5 U
Trans-1,3-Dichloropropene	--	--	--	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Trans-1,4-Dichloro-2-Butene	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Trichloroethylene (TCE)	470	21000	470	UG/KG	1.1 U	0.98 U	0.85 U	1 U
Trichlorofluoromethane	--	--	--	UG/KG	5.4 U	4.9 U	4.2 U	5.1 U
Vinyl Acetate	--	--	--	UG/KG	11 U	9.8 U	8.5 U	10 U
Vinyl Chloride	20	900	20	UG/KG	2.2 U	2 U	1.7 U	2 U
Xylenes	260	100000	1600	UG/KG	2.2 U	2 U	1.7 U	2 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
1,1,1,2-Tetrachloroethane	--	--	--	UG/KG	1 U
1,1,1-Trichloroethane	680	100000	680	UG/KG	1 U
1,1,2,2-Tetrachloroethane	--	--	--	UG/KG	1 U
1,1,2-Trichloroethane	--	--	--	UG/KG	1.5 U
1,1-Dichloroethane	270	26000	270	UG/KG	1.5 U
1,1-Dichloroethene	330	100000	330	UG/KG	1 U
1,1-Dichloropropene	--	--	--	UG/KG	5.1 U
1,2,3-Trichlorobenzene	--	--	--	UG/KG	5.1 U
1,2,3-Trichloropropane	--	--	--	UG/KG	10 U
1,2,4,5-Tetramethylbenzene	--	--	--	UG/KG	4.1 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	5.1 U
1,2,4-Trimethylbenzene	3600	52000	3600	UG/KG	5.1 U
1,2-Dibromo-3-Chloropropane	--	--	--	UG/KG	5.1 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	--	UG/KG	4.1 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	5.1 U
1,2-Dichloroethane	20	3100	20	UG/KG	1 U
1,2-Dichloropropane	--	--	--	UG/KG	3.6 U
1,3,5-Trimethylbenzene (Mesitylene)	8400	52000	8400	UG/KG	5.1 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	5.1 U
1,3-Dichloropropane	--	--	--	UG/KG	5.1 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	5.1 U
1,4-Diethyl Benzene	--	--	--	UG/KG	4.1 U
1,4-Dioxane (P-Dioxane)	100	13000	100	UG/KG	41 U
2,2-Dichloropropane	--	--	--	UG/KG	5.1 U
2-Chlorotoluene	--	--	--	UG/KG	5.1 U
2-Hexanone	--	--	--	UG/KG	10 U
4-Chlorotoluene	--	--	--	UG/KG	5.1 U
4-Ethyltoluene	--	--	--	UG/KG	4.1 U
Acetone	50	100000	50	UG/KG	6.3 J

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
Acrylonitrile	--	--	--	UG/KG	10 U
Benzene	60	4800	60	UG/KG	1 U
Bromobenzene	--	--	--	UG/KG	5.1 U
Bromochloromethane	--	--	--	UG/KG	5.1 U
Bromodichloromethane	--	--	--	UG/KG	1 U
Bromoform	--	--	--	UG/KG	4.1 U
Bromomethane	--	--	--	UG/KG	2 U
Carbon Disulfide	--	--	--	UG/KG	10 U
Carbon Tetrachloride	760	2400	760	UG/KG	1 U
Chlorobenzene	1100	100000	1100	UG/KG	1 U
Chloroethane	--	--	--	UG/KG	2 U
Chloroform	370	49000	370	UG/KG	1.5 U
Chloromethane	--	--	--	UG/KG	5.1 U
Cis-1,2-Dichloroethylene	250	100000	250	UG/KG	1 U
Cis-1,3-Dichloropropene	--	--	--	UG/KG	1 U
Cymene	--	--	--	UG/KG	1 U
Dibromochloromethane	--	--	--	UG/KG	1 U
Dibromomethane	--	--	--	UG/KG	10 U
Dichlorodifluoromethane	--	--	--	UG/KG	10 U
Dichloroethylenes	--	--	--	UG/KG	1 U
Diethyl Ether (Ethyl Ether)	--	--	--	UG/KG	5.1 U
Ethylbenzene	1000	41000	1000	UG/KG	1 U
Hexachlorobutadiene	--	--	--	UG/KG	5.1 U
Isopropylbenzene (Cumene)	--	--	--	UG/KG	1 U
m,p-Xylene	--	--	--	UG/KG	2 U
Methyl Ethyl Ketone (2-Butanone)	120	100000	120	UG/KG	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	--	UG/KG	10 U
Methylene Chloride	50	100000	50	UG/KG	10 U
Naphthalene	12000	100000	12000	UG/KG	5.1 U

Table 2. Summary of Volatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
N-Butylbenzene	12000	100000	12000	UG/KG	1 U
N-Propylbenzene	3900	100000	3900	UG/KG	1 U
O-Xylene (1,2-Dimethylbenzene)	--	--	--	UG/KG	2 U
Sec-Butylbenzene	11000	100000	11000	UG/KG	1 U
Styrene	--	--	--	UG/KG	2 U
T-Butylbenzene	5900	100000	5900	UG/KG	5.1 U
Tert-Butyl Methyl Ether	930	100000	930	UG/KG	0.26 J
Tetrachloroethylene (PCE)	1300	19000	1300	UG/KG	1 U
Toluene	700	100000	700	UG/KG	1.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	--	--	--	UG/KG	1 U
Trans-1,2-Dichloroethene	190	100000	190	UG/KG	1.5 U
Trans-1,3-Dichloropropene	--	--	--	UG/KG	1 U
Trans-1,4-Dichloro-2-Butene	--	--	--	UG/KG	5.1 U
Trichloroethylene (TCE)	470	21000	470	UG/KG	1 U
Trichlorofluoromethane	--	--	--	UG/KG	5.1 U
Vinyl Acetate	--	--	--	UG/KG	10 U
Vinyl Chloride	20	900	20	UG/KG	2 U
Xylenes	260	100000	1600	UG/KG	2 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-1	RXSB-1	RXSB-2	RXSB-2
				Sample Date:	04/24/2017	04/25/2017	04/24/2017	04/25/2017
				Sample Depth (ft bls):	0 - 2	8 - 10	0 - 2	7 - 9
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
1,2,4,5-Tetrachlorobenzene	--	--	--	UG/KG	180 U	170 U	180 U	180 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	180 U	170 U	180 U	180 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	180 U	170 U	180 U	180 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	180 U	170 U	180 U	180 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	180 U	170 U	180 U	180 U
2,4,5-Trichlorophenol	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2,4,6-Trichlorophenol	--	--	--	UG/KG	110 U	100 U	110 U	110 U
2,4-Dichlorophenol	--	--	--	UG/KG	160 U	150 U	170 U	160 U
2,4-Dimethylphenol	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2,4-Dinitrophenol	--	--	--	UG/KG	880 U	820 U	890 U	880 U
2,4-Dinitrotoluene	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2,6-Dinitrotoluene	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Chloronaphthalene	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Chlorophenol	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Methylnaphthalene	--	--	--	UG/KG	220 U	210 U	220 U	220 U
2-Methylphenol (O-Cresol)	330	100000	330	UG/KG	180 U	170 U	180 U	180 U
2-Nitroaniline	--	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Nitrophenol	--	--	--	UG/KG	400 U	370 U	400 U	390 U
3- And 4- Methylphenol (Total)	330	100000	330	UG/KG	260 U	250 U	270 U	260 U
3,3'-Dichlorobenzidine	--	--	--	UG/KG	180 U	170 U	180 U	180 U
3-Nitroaniline	--	--	--	UG/KG	180 U	170 U	180 U	180 U
4,6-Dinitro-2-Methylphenol	--	--	--	UG/KG	480 U	450 U	480 U	470 U
4-Bromophenyl Phenyl Ether	--	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Chloro-3-Methylphenol	--	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Chloroaniline	--	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Chlorophenyl Phenyl Ether	--	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Nitroaniline	--	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Nitrophenol	--	--	--	UG/KG	260 U	240 U	260 U	260 U
Acenaphthene	20000	100000	98000	UG/KG	150 U	140 U	31 J	150 U

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-1	RXSB-1	RXSB-2	RXSB-2
			Sample Date:		04/24/2017	04/25/2017	04/24/2017	04/25/2017
			Sample Depth (ft bls):		0 - 2	8 - 10	0 - 2	7 - 9
			Normal or Field Duplicate:		N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Acenaphthylene	100000	100000	107000	UG/KG	150 U	140 U	150 U	150 U
Acetophenone	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Anthracene	100000	100000	1000000	UG/KG	110 U	100 U	82 J	110 U
Benzo(A)Anthracene	**1000**	1000	1000	UG/KG	160	100 U	250	110 U
Benzo(A)Pyrene	**1000**	1000	22000	UG/KG	110 J	140 U	190	150 U
Benzo(B)Fluoranthene	**1000**	1000	1700	UG/KG	160	100 U	260	110 U
Benzo(G,H,I)Perylene	100000	100000	1000000	UG/KG	60 J	140 U	120 J	150 U
Benzo(K)Fluoranthene	**800**	3900	1700	UG/KG	66 J	100 U	95 J	110 U
Benzoic Acid	--	--	--	UG/KG	600 U	560 U	600 U	590 U
Benzyl Alcohol	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Benzyl Butyl Phthalate	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Biphenyl (Diphenyl)	--	--	--	UG/KG	420 U	390 U	420 U	420 U
Bis(2-Chloroethoxy) Methane	--	--	--	UG/KG	200 U	180 U	200 U	200 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	--	--	UG/KG	160 U	150 U	170 U	160 U
Bis(2-Chloroisopropyl) Ether	--	--	--	UG/KG	220 U	210 U	220 U	220 U
Bis(2-Ethylhexyl) Phthalate	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Carbazole	--	--	--	UG/KG	22 J	170 U	31 J	180 U
Chrysene	**1000**	3900	1000	UG/KG	180	100 U	250	110 U
Dibenz(A,H)Anthracene	**330**	330	1000000	UG/KG	23 J	100 U	35 J	110 U
Dibenzofuran	7000	59000	210000	UG/KG	180 U	170 U	180 U	180 U
Diethyl Phthalate	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Dimethyl Phthalate	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Di-N-Butyl Phthalate	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Di-N-Octylphthalate	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Fluoranthene	100000	100000	1000000	UG/KG	340	100 U	420	110 U
Fluorene	30000	100000	386000	UG/KG	180 U	170 U	33 J	180 U
Hexachlorobenzene	330	1200	3200	UG/KG	110 U	100 U	110 U	110 U
Hexachlorobutadiene	--	--	--	UG/KG	180 U	170 U	180 U	180 U
Hexachlorocyclopentadiene	--	--	--	UG/KG	530 U	490 U	530 U	520 U

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-1	RXSB-1	RXSB-2	RXSB-2
				Sample Date:	04/24/2017	04/25/2017	04/24/2017	04/25/2017
				Sample Depth (ft bls):	0 - 2	8 - 10	0 - 2	7 - 9
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Hexachloroethane	--	--	--	UG/KG	150 U	140 U	150 U	150 U
Indeno(1,2,3-C,D)Pyrene	**500**	500	8200	UG/KG	72 J	140 U	140 J	150 U
Isophorone	--	--	--	UG/KG	160 U	150 U	170 U	160 U
Naphthalene	12000	100000	12000	UG/KG	180 U	170 U	180 U	180 U
Nitrobenzene	--	--	--	UG/KG	160 U	150 U	170 U	160 U
N-Nitrosodi-N-Propylamine	--	--	--	UG/KG	180 U	170 U	180 U	180 U
N-Nitrosodiphenylamine	--	--	--	UG/KG	150 U	140 U	150 U	150 U
Pentachlorophenol	800	6700	800	UG/KG	150 U	140 U	150 U	150 U
Phenanthrene	100000	100000	1000000	UG/KG	210	100 U	330	110 U
Phenol	330	100000	330	UG/KG	180 U	170 U	180 U	180 U
Pyrene	100000	100000	1000000	UG/KG	300	100 U	380	110 U

J - Estimated value

U - Indicates that the compound was analyzed for but not detected

FD - Duplicate sample

µg/kg - Micrograms per kilogram

ft bls - Feet below land surface

NYSDEC - New York State Department of Environmental Conservation

SCO - Soil Cleanup Objectives

-- No SCO available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO

Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-3	RXSB-3	RXSB-4	RXSB-4
				Sample Date:	04/25/2017	04/26/2017	04/24/2017	04/24/2017
				Sample Depth (ft bls):	0 - 2	6 - 8	0 - 2	0 - 2
				Normal or Field Duplicate:	N	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
1,2,4,5-Tetrachlorobenzene	--	--	--	UG/KG	190 U	190 U	890 U	890 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	190 U	190 U	890 U	890 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	190 U	190 U	890 U	890 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	190 U	190 U	890 U	890 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	190 U	190 U	890 U	890 U
2,4,5-Trichlorophenol	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2,4,6-Trichlorophenol	--	--	--	UG/KG	110 U	110 U	540 U	540 U
2,4-Dichlorophenol	--	--	--	UG/KG	170 U	170 U	800 U	800 U
2,4-Dimethylphenol	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2,4-Dinitrophenol	--	--	--	UG/KG	900 U	900 U	4300 U	4300 U
2,4-Dinitrotoluene	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2,6-Dinitrotoluene	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2-Chloronaphthalene	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2-Chlorophenol	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2-Methylnaphthalene	--	--	--	UG/KG	50 J	220 U	220 J	240 J
2-Methylphenol (O-Cresol)	330	100000	330	UG/KG	190 U	190 U	890 U	890 U
2-Nitroaniline	--	--	--	UG/KG	190 U	190 U	890 U	890 U
2-Nitrophenol	--	--	--	UG/KG	410 U	400 U	1900 U	1900 U
3- And 4- Methylphenol (Total)	330	100000	330	UG/KG	270 U	270 U	1300 U	1300 U
3,3'-Dichlorobenzidine	--	--	--	UG/KG	190 U	190 U	890 U	890 U
3-Nitroaniline	--	--	--	UG/KG	190 U	190 U	890 U	890 U
4,6-Dinitro-2-Methylphenol	--	--	--	UG/KG	490 U	480 U	2300 U	2300 U
4-Bromophenyl Phenyl Ether	--	--	--	UG/KG	190 U	190 U	890 U	890 U
4-Chloro-3-Methylphenol	--	--	--	UG/KG	190 U	190 U	890 U	890 U
4-Chloroaniline	--	--	--	UG/KG	190 U	190 U	890 U	890 U
4-Chlorophenyl Phenyl Ether	--	--	--	UG/KG	190 U	190 U	890 U	890 U
4-Nitroaniline	--	--	--	UG/KG	190 U	190 U	890 U	890 U
4-Nitrophenol	--	--	--	UG/KG	260 U	260 U	1200 U	1200 U
Acenaphthene	20000	100000	98000	UG/KG	20 J	150 U	1300	1400

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	RXSB-3	RXSB-3	RXSB-4	RXSB-4
Sample Designation:					RXSB-3	RXSB-3	RXSB-4	RXSB-4
Sample Date:					04/25/2017	04/26/2017	04/24/2017	04/24/2017
Sample Depth (ft bls):					0 - 2	6 - 8	0 - 2	0 - 2
Normal or Field Duplicate:					N	N	N	FD
Acenaphthylene	100000	100000	107000	UG/KG	150 U	150 U	710 U	710 U
Acetophenone	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Anthracene	100000	100000	1000000	UG/KG	44 J	110 U	1700	1800
Benzo(A)Anthracene	**1000**	1000	1000	UG/KG	150	22 J	**4000**	**3600**
Benzo(A)Pyrene	**1000**	1000	22000	UG/KG	150	150 U	**3500**	**3300**
Benzo(B)Fluoranthene	**1000**	1000	1700	UG/KG	220	110 U	**4800**	**4200**
Benzo(G,H,I)Perylene	100000	100000	1000000	UG/KG	100 J	150 U	2100	1900
Benzo(K)Fluoranthene	**800**	3900	1700	UG/KG	76 J	110 U	**1500**	**1400**
Benzoic Acid	--	--	--	UG/KG	610 U	600 U	2900 U	2900 U
Benzyl Alcohol	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Benzyl Butyl Phthalate	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Biphenyl (Diphenyl)	--	--	--	UG/KG	430 U	420 U	2000 U	2000 U
Bis(2-Chloroethoxy) Methane	--	--	--	UG/KG	200 U	200 U	960 U	960 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	--	--	UG/KG	170 U	170 U	800 U	800 U
Bis(2-Chloroisopropyl) Ether	--	--	--	UG/KG	220 U	220 U	1100 U	1100 U
Bis(2-Ethylhexyl) Phthalate	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Carbazole	--	--	--	UG/KG	33 J	190 U	840 J	870 J
Chrysene	**1000**	3900	1000	UG/KG	160	110 U	**3500**	**3200**
Dibenz(A,H)Anthracene	**330**	330	1000000	UG/KG	26 J	110 U	**580**	**540**
Dibenzofuran	7000	59000	210000	UG/KG	190 U	190 U	470 J	520 J
Diethyl Phthalate	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Dimethyl Phthalate	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Di-N-Butyl Phthalate	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Di-N-Octylphthalate	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Fluoranthene	100000	100000	1000000	UG/KG	330	23 J	7900	7400
Fluorene	30000	100000	386000	UG/KG	190 U	190 U	900	980
Hexachlorobenzene	330	1200	3200	UG/KG	110 U	110 U	540 U	540 U
Hexachlorobutadiene	--	--	--	UG/KG	190 U	190 U	890 U	890 U
Hexachlorocyclopentadiene	--	--	--	UG/KG	540 U	530 U	2600 U	2600 U

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-3	RXSB-3	RXSB-4	RXSB-4
				Sample Date:	04/25/2017	04/26/2017	04/24/2017	04/24/2017
				Sample Depth (ft bls):	0 - 2	6 - 8	0 - 2	0 - 2
				Normal or Field Duplicate:	N	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Hexachloroethane	--	--	--	UG/KG	150 U	150 U	710 U	710 U
Indeno(1,2,3-C,D)Pyrene	**500**	500	8200	UG/KG	110 J	150 U	**2500**	**2300**
Isophorone	--	--	--	UG/KG	170 U	170 U	800 U	800 U
Naphthalene	12000	100000	12000	UG/KG	41 J	190 U	730 J	900
Nitrobenzene	--	--	--	UG/KG	170 U	170 U	800 U	800 U
N-Nitrosodi-N-Propylamine	--	--	--	UG/KG	190 U	190 U	890 U	890 U
N-Nitrosodiphenylamine	--	--	--	UG/KG	150 U	150 U	710 U	710 U
Pentachlorophenol	800	6700	800	UG/KG	150 U	150 U	710 U	710 U
Phenanthrene	100000	100000	1000000	UG/KG	200	110 U	5600	5600
Phenol	330	100000	330	UG/KG	190 U	190 U	890 U	890 U
Pyrene	100000	100000	1000000	UG/KG	270	20 J	6300	5700

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-4	RXSB-5	RXSB-5	RXSB-6
				Sample Date:	04/25/2017	04/25/2017	04/26/2017	04/24/2017
				Sample Depth (ft bls):	11 - 13	0 - 2	5 - 6	0 - 2
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
1,2,4,5-Tetrachlorobenzene	--	--	--	UG/KG	170 U	190 U	180 U	180 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	170 U	190 U	180 U	180 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	170 U	190 U	180 U	180 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	170 U	190 U	180 U	180 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	170 U	190 U	180 U	180 U
2,4,5-Trichlorophenol	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2,4,6-Trichlorophenol	--	--	--	UG/KG	100 U	120 U	110 U	110 U
2,4-Dichlorophenol	--	--	--	UG/KG	160 U	180 U	160 U	160 U
2,4-Dimethylphenol	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2,4-Dinitrophenol	--	--	--	UG/KG	830 U	940 U	880 U	860 U
2,4-Dinitrotoluene	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2,6-Dinitrotoluene	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2-Chloronaphthalene	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2-Chlorophenol	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2-Methylnaphthalene	--	--	--	UG/KG	210 U	230 U	220 U	34 J
2-Methylphenol (O-Cresol)	330	100000	330	UG/KG	170 U	190 U	180 U	180 U
2-Nitroaniline	--	--	--	UG/KG	170 U	190 U	180 U	180 U
2-Nitrophenol	--	--	--	UG/KG	370 U	420 U	390 U	390 U
3- And 4- Methylphenol (Total)	330	100000	330	UG/KG	250 U	280 U	260 U	260 U
3,3'-Dichlorobenzidine	--	--	--	UG/KG	170 U	190 U	180 U	180 U
3-Nitroaniline	--	--	--	UG/KG	170 U	190 U	180 U	180 U
4,6-Dinitro-2-Methylphenol	--	--	--	UG/KG	450 U	510 U	470 U	460 U
4-Bromophenyl Phenyl Ether	--	--	--	UG/KG	170 U	190 U	180 U	180 U
4-Chloro-3-Methylphenol	--	--	--	UG/KG	170 U	190 U	180 U	180 U
4-Chloroaniline	--	--	--	UG/KG	170 U	190 U	180 U	180 U
4-Chlorophenyl Phenyl Ether	--	--	--	UG/KG	170 U	190 U	180 U	180 U
4-Nitroaniline	--	--	--	UG/KG	170 U	190 U	180 U	180 U
4-Nitrophenol	--	--	--	UG/KG	240 U	270 U	260 U	250 U
Acenaphthene	20000	100000	98000	UG/KG	140 U	22 J	140 U	340

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-4	RXSB-5	RXSB-5	RXSB-6
				Sample Date:	04/25/2017	04/25/2017	04/26/2017	04/24/2017
				Sample Depth (ft bls):	11 - 13	0 - 2	5 - 6	0 - 2
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Acenaphthylene	100000	100000	107000	UG/KG	140 U	160 U	140 U	140 U
Acetophenone	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Anthracene	100000	100000	1000000	UG/KG	100 U	120 U	110 U	730
Benzo(A)Anthracene	**1000**	1000	1000	UG/KG	100 U	88 J	110 U	**1500**
Benzo(A)Pyrene	**1000**	1000	22000	UG/KG	140 U	78 J	140 U	1000
Benzo(B)Fluoranthene	**1000**	1000	1700	UG/KG	100 U	100 J	110 U	**1400**
Benzo(G,H,I)Perylene	100000	100000	1000000	UG/KG	140 U	47 J	140 U	510
Benzo(K)Fluoranthene	**800**	3900	1700	UG/KG	100 U	42 J	110 U	480
Benzoic Acid	--	--	--	UG/KG	560 U	630 U	590 U	580 U
Benzyl Alcohol	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Benzyl Butyl Phthalate	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Biphenyl (Diphenyl)	--	--	--	UG/KG	390 U	440 U	420 U	410 U
Bis(2-Chloroethoxy) Methane	--	--	--	UG/KG	190 U	210 U	200 U	190 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	--	--	UG/KG	160 U	180 U	160 U	160 U
Bis(2-Chloroisopropyl) Ether	--	--	--	UG/KG	210 U	230 U	220 U	210 U
Bis(2-Ethylhexyl) Phthalate	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Carbazole	--	--	--	UG/KG	170 U	190 U	180 U	160 J
Chrysene	**1000**	3900	1000	UG/KG	100 U	84 J	110 U	**1300**
Dibenz(A,H)Anthracene	**330**	330	1000000	UG/KG	100 U	120 U	110 U	140
Dibenzofuran	7000	59000	210000	UG/KG	170 U	190 U	180 U	170 J
Diethyl Phthalate	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Dimethyl Phthalate	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Di-N-Butyl Phthalate	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Di-N-Octylphthalate	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Fluoranthene	100000	100000	1000000	UG/KG	100 U	180	110 U	3200
Fluorene	30000	100000	386000	UG/KG	170 U	190 U	180 U	310
Hexachlorobenzene	330	1200	3200	UG/KG	100 U	120 U	110 U	110 U
Hexachlorobutadiene	--	--	--	UG/KG	170 U	190 U	180 U	180 U
Hexachlorocyclopentadiene	--	--	--	UG/KG	500 U	560 U	520 U	510 U

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-4	RXSB-5	RXSB-5	RXSB-6
				Sample Date:	04/25/2017	04/25/2017	04/26/2017	04/24/2017
				Sample Depth (ft bls):	11 - 13	0 - 2	5 - 6	0 - 2
				Normal or Field Duplicate:	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit				
Hexachloroethane	--	--	--	UG/KG	140 U	160 U	140 U	140 U
Indeno(1,2,3-C,D)Pyrene	**500**	500	8200	UG/KG	140 U	59 J	140 U	**580**
Isophorone	--	--	--	UG/KG	160 U	180 U	160 U	160 U
Naphthalene	12000	100000	12000	UG/KG	170 U	190 U	180 U	27 J
Nitrobenzene	--	--	--	UG/KG	160 U	180 U	160 U	160 U
N-Nitrosodi-N-Propylamine	--	--	--	UG/KG	170 U	190 U	180 U	180 U
N-Nitrosodiphenylamine	--	--	--	UG/KG	140 U	160 U	140 U	140 U
Pentachlorophenol	800	6700	800	UG/KG	140 U	160 U	140 U	140 U
Phenanthrene	100000	100000	1000000	UG/KG	100 U	130	110 U	3600
Phenol	330	100000	330	UG/KG	170 U	190 U	180 U	180 U
Pyrene	100000	100000	1000000	UG/KG	100 U	140	110 U	2700

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
1,2,4,5-Tetrachlorobenzene	--	--	--	UG/KG	190 U
1,2,4-Trichlorobenzene	--	--	--	UG/KG	190 U
1,2-Dichlorobenzene	1100	100000	1100	UG/KG	190 U
1,3-Dichlorobenzene	2400	49000	2400	UG/KG	190 U
1,4-Dichlorobenzene	1800	13000	1800	UG/KG	190 U
2,4,5-Trichlorophenol	--	--	--	UG/KG	190 U
2,4,6-Trichlorophenol	--	--	--	UG/KG	120 U
2,4-Dichlorophenol	--	--	--	UG/KG	170 U
2,4-Dimethylphenol	--	--	--	UG/KG	190 U
2,4-Dinitrophenol	--	--	--	UG/KG	930 U
2,4-Dinitrotoluene	--	--	--	UG/KG	190 U
2,6-Dinitrotoluene	--	--	--	UG/KG	190 U
2-Chloronaphthalene	--	--	--	UG/KG	190 U
2-Chlorophenol	--	--	--	UG/KG	190 U
2-Methylnaphthalene	--	--	--	UG/KG	230 U
2-Methylphenol (O-Cresol)	330	100000	330	UG/KG	190 U
2-Nitroaniline	--	--	--	UG/KG	190 U
2-Nitrophenol	--	--	--	UG/KG	420 U
3- And 4- Methylphenol (Total)	330	100000	330	UG/KG	280 U
3,3'-Dichlorobenzidine	--	--	--	UG/KG	190 U
3-Nitroaniline	--	--	--	UG/KG	190 U
4,6-Dinitro-2-Methylphenol	--	--	--	UG/KG	500 U
4-Bromophenyl Phenyl Ether	--	--	--	UG/KG	190 U
4-Chloro-3-Methylphenol	--	--	--	UG/KG	190 U
4-Chloroaniline	--	--	--	UG/KG	190 U
4-Chlorophenyl Phenyl Ether	--	--	--	UG/KG	190 U
4-Nitroaniline	--	--	--	UG/KG	190 U
4-Nitrophenol	--	--	--	UG/KG	270 U
Acenaphthene	20000	100000	98000	UG/KG	160 U

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
Acenaphthylene	100000	100000	107000	UG/KG	160 U
Acetophenone	--	--	--	UG/KG	190 U
Anthracene	100000	100000	1000000	UG/KG	120 U
Benzo(A)Anthracene	**1000**	1000	1000	UG/KG	120 U
Benzo(A)Pyrene	**1000**	1000	22000	UG/KG	160 U
Benzo(B)Fluoranthene	**1000**	1000	1700	UG/KG	120 U
Benzo(G,H,I)Perylene	100000	100000	1000000	UG/KG	160 U
Benzo(K)Fluoranthene	**800**	3900	1700	UG/KG	120 U
Benzoic Acid	--	--	--	UG/KG	630 U
Benzyl Alcohol	--	--	--	UG/KG	190 U
Benzyl Butyl Phthalate	--	--	--	UG/KG	190 U
Biphenyl (Diphenyl)	--	--	--	UG/KG	440 U
Bis(2-Chloroethoxy) Methane	--	--	--	UG/KG	210 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	--	--	UG/KG	170 U
Bis(2-Chloroisopropyl) Ether	--	--	--	UG/KG	230 U
Bis(2-Ethylhexyl) Phthalate	--	--	--	UG/KG	190 U
Carbazole	--	--	--	UG/KG	190 U
Chrysene	**1000**	3900	1000	UG/KG	120 U
Dibenz(A,H)Anthracene	**330**	330	1000000	UG/KG	120 U
Dibenzofuran	7000	59000	210000	UG/KG	190 U
Diethyl Phthalate	--	--	--	UG/KG	190 U
Dimethyl Phthalate	--	--	--	UG/KG	190 U
Di-N-Butyl Phthalate	--	--	--	UG/KG	190 U
Di-N-Octylphthalate	--	--	--	UG/KG	190 U
Fluoranthene	100000	100000	1000000	UG/KG	22 J
Fluorene	30000	100000	386000	UG/KG	190 U
Hexachlorobenzene	330	1200	3200	UG/KG	120 U
Hexachlorobutadiene	--	--	--	UG/KG	190 U
Hexachlorocyclopentadiene	--	--	--	UG/KG	560 U

Table 3. Summary of Semivolatile Organic Compounds in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
Hexachloroethane	--	--	--	UG/KG	160 U
Indeno(1,2,3-C,D)Pyrene	**500**	500	8200	UG/KG	160 U
Isophorone	--	--	--	UG/KG	170 U
Naphthalene	12000	100000	12000	UG/KG	190 U
Nitrobenzene	--	--	--	UG/KG	170 U
N-Nitrosodi-N-Propylamine	--	--	--	UG/KG	190 U
N-Nitrosodiphenylamine	--	--	--	UG/KG	160 U
Pentachlorophenol	800	6700	800	UG/KG	160 U
Phenanthrene	100000	100000	1000000	UG/KG	120 U
Phenol	330	100000	330	UG/KG	190 U
Pyrene	100000	100000	1000000	UG/KG	22 J

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 4. Summary of Metals in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:	RXSB-1	RXSB-1	RXSB-2	RXSB-2	RXSB-3	RXSB-3
			Sample Date:	04/24/2017	04/25/2017	04/24/2017	04/25/2017	04/25/2017	04/26/2017
			Sample Depth (ft bls):	0 - 2	8 - 10	0 - 2	7 - 9	0 - 2	6 - 8
			Normal or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit					
Aluminum	--	--	--	MG/KG	8200	11000	5500	9500	6900	6100
Antimony	--	--	--	MG/KG	4.2 U	4 U	4.4 U	4.4 U	4.3 U	4.3 U
Arsenic	**13**	16	16	MG/KG	2.9	0.8 U	5.5	1.5	**18**	0.87
Barium	350	400	820	MG/KG	72	110	95	73	100	60
Beryllium	7.2	72	47	MG/KG	0.28 J	0.4 U	0.26 J	0.07 J	0.48	0.31 J
Cadmium	2.5	4.3	7.5	MG/KG	0.52 J	0.8 U	0.38 J	0.12 J	0.35 J	0.38 J
Calcium	--	--	--	MG/KG	45000	5200	87000	1700	22000	11000
Chromium, Total	30	180	--	MG/KG	18	21	12	22	17	14
Cobalt	--	--	--	MG/KG	9	8.6	5.8	9.5	7.3	7.5
Copper	**50**	270	1720	MG/KG	33	23	24	24	**64**	22
Iron	--	--	--	MG/KG	17000	16000	11000	19000	24000	12000
Lead	**63**	400	450	MG/KG	27	5.7	45	5.3	62	12
Magnesium	--	--	--	MG/KG	25000	4300	48000	3600	8700	7700
Manganese	1600	2000	2000	MG/KG	160	100	160	280	310	240
Mercury	0.18	0.81	0.73	MG/KG	0.03 J	0.07 U	0.06 J	0.07 U	0.1	0.02 J
Nickel	30	310	130	MG/KG	14	19	10	17	16	13
Potassium	--	--	--	MG/KG	3500	7600	1700	3600	1800	2000
Selenium	3.9	180	4	MG/KG	0.52 J	1.6 U	0.6 J	1.8 U	1.4 J	0.73 J
Silver	2	180	8.3	MG/KG	0.85 U	0.8 U	0.89 U	0.88 U	0.87 U	0.86 U
Sodium	--	--	--	MG/KG	120 J	87 J	260	100 J	140 J	100 J
Thallium	--	--	--	MG/KG	1.7 U	1.6 U	1.8 U	1.8 U	1.7 U	1.7 U
Vanadium	--	--	--	MG/KG	33	27	24	30	33	21
Zinc	**109**	10000	2480	MG/KG	92	56	63	55	**270**	37

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 4. Summary of Metals in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-4	RXSB-4	RXSB-4	RXSB-5	RXSB-5	RXSB-6
			Sample Date:		04/24/2017	04/24/2017	04/25/2017	04/25/2017	04/26/2017	04/24/2017
			Sample Depth (ft bls):		0 - 2	0 - 2	11 - 13	0 - 2	5 - 6	0 - 2
			Normal or Field Duplicate:		N	FD	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit						
Aluminum	--	--	--	MG/KG	4900	4900	11000	6700	4300	3500
Antimony	--	--	--	MG/KG	4.2 U	4.2 U	4.1 U	4.6 U	4.3 U	4.2 U
Arsenic	**13**	16	16	MG/KG	1.7	1.6	0.81 U	7.6	0.9	4.3
Barium	350	400	820	MG/KG	64	76	150	100	33	70
Beryllium	7.2	72	47	MG/KG	0.41 J	0.4 J	0.21 J	0.57	0.47	1.1
Cadmium	2.5	4.3	7.5	MG/KG	0.42 J	0.45 J	0.14 J	0.45 J	0.49 J	0.64 J
Calcium	--	--	--	MG/KG	30000	30000	1200	36000	60000	69000
Chromium, Total	30	180	--	MG/KG	14	14	22	14	12	19
Cobalt	--	--	--	MG/KG	7.3	7.6	10	7	5.1	12
Copper	**50**	270	1720	MG/KG	43	48	28	29	8.2	**190**
Iron	--	--	--	MG/KG	11000	11000	20000	19000	11000	15000
Lead	**63**	400	450	MG/KG	**64**	50	5.8	22	2.6 J	**150**
Magnesium	--	--	--	MG/KG	14000	14000	4000	15000	30000	23000
Manganese	1600	2000	2000	MG/KG	190	240	140	370	340	170
Mercury	0.18	0.81	0.73	MG/KG	0.06 J	0.07	0.07 U	0.08	0.07 U	0.03 J
Nickel	30	310	130	MG/KG	14	15	19	13	7.7	27
Potassium	--	--	--	MG/KG	2100	2200	6900	2000	1200	700
Selenium	3.9	180	4	MG/KG	0.5 J	0.6 J	1.6 U	1.8 U	0.7 J	0.83 J
Silver	2	180	8.3	MG/KG	0.84 U	0.84 U	0.81 U	0.92 U	0.86 U	0.84 U
Sodium	--	--	--	MG/KG	92 J	100 J	76 J	140 J	120 J	160 J
Thallium	--	--	--	MG/KG	1.7 U	1.7 U	1.6 U	1.8 U	1.7 U	1.7 U
Vanadium	--	--	--	MG/KG	21	22	29	27	17	16
Zinc	**109**	10000	2480	MG/KG	**210**	**230**	49	**120**	36	**1200**

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 4. Summary of Metals in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
Aluminum	--	--	--	MG/KG	6400
Antimony	--	--	--	MG/KG	4.7 U
Arsenic	**13**	16	16	MG/KG	0.4 J
Barium	350	400	820	MG/KG	73
Beryllium	7.2	72	47	MG/KG	0.48
Cadmium	2.5	4.3	7.5	MG/KG	0.15 J
Calcium	--	--	--	MG/KG	7600
Chromium, Total	30	180	--	MG/KG	21
Cobalt	--	--	--	MG/KG	9.1
Copper	**50**	270	1720	MG/KG	**72**
Iron	--	--	--	MG/KG	16000
Lead	**63**	400	450	MG/KG	49
Magnesium	--	--	--	MG/KG	4600
Manganese	1600	2000	2000	MG/KG	220
Mercury	0.18	0.81	0.73	MG/KG	0.07 U
Nickel	30	310	130	MG/KG	17
Potassium	--	--	--	MG/KG	2300
Selenium	3.9	180	4	MG/KG	1.9 U
Silver	2	180	8.3	MG/KG	0.93 U
Sodium	--	--	--	MG/KG	120 J
Thallium	--	--	--	MG/KG	1.9 U
Vanadium	--	--	--	MG/KG	26
Zinc	**109**	10000	2480	MG/KG	**440**

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
mg/kg - Milligrams per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 5. Summary of Polychlorinated Biphenyls in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-1	RXSB-1	RXSB-2	RXSB-2	RXSB-3
			Sample Date:		04/24/2017	04/25/2017	04/24/2017	04/25/2017	04/25/2017
			Sample Depth (ft bls):		0 - 2	8 - 10	0 - 2	7 - 9	0 - 2
			Normal or Field Duplicate:		N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit					
PCB-1016 (Aroclor 1016)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
PCB-1221 (Aroclor 1221)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
PCB-1232 (Aroclor 1232)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
PCB-1242 (Aroclor 1242)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
PCB-1248 (Aroclor 1248)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
PCB-1254 (Aroclor 1254)	--	--	--	UG/KG	35 U	32.5 U	17.2 J	35.7 U	37.1 U
PCB-1260 (Aroclor 1260)	--	--	--	UG/KG	35 U	32.5 U	4.82 J	35.7 U	37.1 U
PCB-1262 (Aroclor 1262)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
PCB-1268 (Aroclor 1268)	--	--	--	UG/KG	35 U	32.5 U	35.9 U	35.7 U	37.1 U
Polychlorinated Biphenyl (PCBs)	100	1000	3200	UG/KG	35 U	32.5 U	22 J	35.7 U	37.1 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 5. Summary of Polychlorinated Biphenyls in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-3	RXSB-4	RXSB-4	RXSB-4	RXSB-5
			Sample Date:		04/26/2017	04/24/2017	04/24/2017	04/25/2017	04/25/2017
			Sample Depth (ft bls):		6 - 8	0 - 2	0 - 2	11 - 13	0 - 2
			Normal or Field Duplicate:		N	N	FD	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit					
PCB-1016 (Aroclor 1016)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
PCB-1221 (Aroclor 1221)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
PCB-1232 (Aroclor 1232)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
PCB-1242 (Aroclor 1242)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
PCB-1248 (Aroclor 1248)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
PCB-1254 (Aroclor 1254)	--	--	--	UG/KG	35.7 U	13.3 J	27.6 J	33.8 U	37.7 U
PCB-1260 (Aroclor 1260)	--	--	--	UG/KG	35.7 U	5.7 J	8.75 J	33.8 U	37.7 U
PCB-1262 (Aroclor 1262)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
PCB-1268 (Aroclor 1268)	--	--	--	UG/KG	35.7 U	35.4 U	35.1 U	33.8 U	37.7 U
Polychlorinated Biphenyl (PCBs)	100	1000	3200	UG/KG	35.7 U	19 J	36.4 J	33.8 U	37.7 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 5. Summary of Polychlorinated Biphenyls in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-5	RXSB-6	RXSB-6
			Sample Date:		04/26/2017	04/24/2017	04/25/2017
			Sample Depth (ft bls):		5 - 6	0 - 2	8 - 10
			Normal or Field Duplicate:		N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit			
PCB-1016 (Aroclor 1016)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
PCB-1221 (Aroclor 1221)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
PCB-1232 (Aroclor 1232)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
PCB-1242 (Aroclor 1242)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
PCB-1248 (Aroclor 1248)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
PCB-1254 (Aroclor 1254)	--	--	--	UG/KG	36.2 U	16.2 J	37.4 U
PCB-1260 (Aroclor 1260)	--	--	--	UG/KG	36.2 U	8.66 J	37.4 U
PCB-1262 (Aroclor 1262)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
PCB-1268 (Aroclor 1268)	--	--	--	UG/KG	36.2 U	34.7 U	37.4 U
Polychlorinated Biphenyl (PCBs)	100	1000	3200	UG/KG	36.2 U	24.9 J	37.4 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 6. Summary of Pesticides and Herbicides in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-1	RXSB-1	RXSB-2
				Sample Date:	04/24/2017	04/25/2017	04/24/2017
				Sample Depth (ft bls):	0 - 2	8 - 10	0 - 2
				Normal or Field Duplicate:	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit			
Aldrin	5	97	190	UG/KG	1.71 U	1.58 U	1.77 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	20	480	20	UG/KG	0.712 U	0.657 U	0.739 U
Alpha Endosulfan	2400	24000	102000	UG/KG	1.71 U	1.58 U	1.77 U
Beta Bhc (Beta Hexachlorocyclohexane)	36	360	90	UG/KG	1.71 U	1.58 U	1.77 U
Beta Endosulfan	2400	24000	102000	UG/KG	1.71 U	1.58 U	1.77 U
Chlordane	--	--	--	UG/KG	13.9 U	12.8 U	20.9 PI
cis-Chlordane	94	4200	2900	UG/KG	2.14 U	1.97 U	6.29 P
Delta BHC (Delta Hexachlorocyclohexane)	40	100000	250	UG/KG	1.71 U	1.58 U	1.77 U
Dieldrin	5	200	100	UG/KG	1.07 U	0.986 U	1.11 U
Endosulfan Sulfate	2400	24000	1000000	UG/KG	0.712 U	0.657 U	0.739 U
Endrin	14	11000	60	UG/KG	0.418 J	0.657 U	0.739 U
Endrin Aldehyde	--	--	--	UG/KG	2.14 U	1.97 U	2.22 U
Endrin Ketone	--	--	--	UG/KG	1.71 U	1.58 U	1.77 U
Gamma Bhc (Lindane)	100	1300	100	UG/KG	0.712 U	0.657 U	0.739 U
Heptachlor	42	2100	380	UG/KG	0.855 U	0.789 U	0.887 U
Heptachlor Epoxide	--	--	--	UG/KG	3.21 U	2.96 U	3.33 U
Methoxychlor	--	--	--	UG/KG	3.21 U	2.96 U	3.33 U
P,P'-DDD	**3.3**	13000	14000	UG/KG	1.71 U	1.58 U	1.77 U
P,P'-DDE	**3.3**	8900	17000	UG/KG	0.868 J	1.58 U	1.77 U
P,P'-DDT	**3.3**	7900	136000	UG/KG	3.21 U	2.96 U	3.33 U
Toxaphene	--	--	--	UG/KG	32.1 U	29.6 U	33.3 U
trans-Chlordane	--	--	--	UG/KG	2.14 U	1.97 U	4.99 PI

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 6. Summary of Pesticides and Herbicides in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-2	RXSB-3	RXSB-3
			Sample Date:		04/25/2017	04/25/2017	04/26/2017
			Sample Depth (ft bls):		7 - 9	0 - 2	6 - 8
			Normal or Field Duplicate:		N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit			
Aldrin	5	97	190	UG/KG	1.74 U	1.73 U	1.74 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	20	480	20	UG/KG	0.727 U	0.722 U	0.726 U
Alpha Endosulfan	2400	24000	102000	UG/KG	1.74 U	1.73 U	1.74 U
Beta Bhc (Beta Hexachlorocyclohexane)	36	360	90	UG/KG	1.74 U	1.73 U	1.74 U
Beta Endosulfan	2400	24000	102000	UG/KG	1.74 U	1.73 U	1.74 U
Chlordane	--	--	--	UG/KG	14.2 U	14.1 U	14.2 U
cis-Chlordane	94	4200	2900	UG/KG	2.18 U	2.16 U	2.18 U
Delta BHC (Delta Hexachlorocyclohexane)	40	100000	250	UG/KG	1.74 U	1.73 U	1.74 U
Dieldrin	5	200	100	UG/KG	1.09 U	1.08 U	1.09 U
Endosulfan Sulfate	2400	24000	1000000	UG/KG	0.727 U	0.722 U	0.726 U
Endrin	14	11000	60	UG/KG	0.727 U	0.722 U	0.726 U
Endrin Aldehyde	--	--	--	UG/KG	2.18 U	2.16 U	2.18 U
Endrin Ketone	--	--	--	UG/KG	1.74 U	1.73 U	1.74 U
Gamma Bhc (Lindane)	100	1300	100	UG/KG	0.727 U	0.722 U	0.726 U
Heptachlor	42	2100	380	UG/KG	0.872 U	0.866 U	0.871 U
Heptachlor Epoxide	--	--	--	UG/KG	3.27 U	3.25 U	3.26 U
Methoxychlor	--	--	--	UG/KG	3.27 U	3.25 U	3.26 U
P,P'-DDD	**3.3**	13000	14000	UG/KG	1.74 U	1.73 U	1.74 U
P,P'-DDE	**3.3**	8900	17000	UG/KG	1.74 U	0.931 J	1.74 U
P,P'-DDT	**3.3**	7900	136000	UG/KG	3.27 U	3.25 U	3.26 U
Toxaphene	--	--	--	UG/KG	32.7 U	32.5 U	32.6 U
trans-Chlordane	--	--	--	UG/KG	0.607 JPI	1.19 JPI	1.65 J

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 6. Summary of Pesticides and Herbicides in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-4	RXSB-4	RXSB-4
			Sample Date:		04/24/2017	04/24/2017	04/25/2017
			Sample Depth (ft bls):		0 - 2	0 - 2	11 - 13
			Normal or Field Duplicate:		N	FD	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit			
Aldrin	5	97	190	UG/KG	1.67 U	1.62 U	1.6 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	20	480	20	UG/KG	0.695 U	0.676 U	0.668 U
Alpha Endosulfan	2400	24000	102000	UG/KG	1.67 U	1.62 U	1.6 U
Beta Bhc (Beta Hexachlorocyclohexane)	36	360	90	UG/KG	1.67 U	1.62 U	1.6 U
Beta Endosulfan	2400	24000	102000	UG/KG	0.815 J	1.52 J	1.6 U
Chlordane	--	--	--	UG/KG	13.5 U	13.2 U	13 U
cis-Chlordane	94	4200	2900	UG/KG	2.08 U	2.03 U	2 U
Delta BHC (Delta Hexachlorocyclohexane)	40	100000	250	UG/KG	1.67 U	1.62 U	1.6 U
Dieldrin	5	200	100	UG/KG	1.04 U	1.01 U	1 U
Endosulfan Sulfate	2400	24000	1000000	UG/KG	0.444 JPI	0.676 U	0.668 U
Endrin	14	11000	60	UG/KG	0.695 U	0.676 U	0.668 U
Endrin Aldehyde	--	--	--	UG/KG	2.08 U	2.03 U	2 U
Endrin Ketone	--	--	--	UG/KG	1.67 U	1.62 U	1.6 U
Gamma Bhc (Lindane)	100	1300	100	UG/KG	0.695 U	0.676 U	0.668 U
Heptachlor	42	2100	380	UG/KG	0.834 U	0.811 U	0.802 U
Heptachlor Epoxide	--	--	--	UG/KG	3.13 U	3.04 U	3.01 U
Methoxychlor	--	--	--	UG/KG	3.13 U	3.04 U	3.01 U
P,P'-DDD	**3.3**	13000	14000	UG/KG	1.15 JPI	**4.57**	1.6 U
P,P'-DDE	**3.3**	8900	17000	UG/KG	1.67 U	1.62 U	1.6 U
P,P'-DDT	**3.3**	7900	136000	UG/KG	1.58 J	2.47 J	3.01 U
Toxaphene	--	--	--	UG/KG	31.3 U	30.4 U	30.1 U
trans-Chlordane	--	--	--	UG/KG	1.78 JPI	1.12 JPI	0.536 JPI

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 6. Summary of Pesticides and Herbicides in Soil, 1221 Spofford Avenue, Bronx, New York

			Sample Designation:		RXSB-5	RXSB-5	RXSB-6
			Sample Date:		04/25/2017	04/26/2017	04/24/2017
			Sample Depth (ft bls):		0 - 2	5 - 6	0 - 2
			Normal or Field Duplicate:		N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit			
Aldrin	5	97	190	UG/KG	1.76 U	1.74 U	1.63 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	20	480	20	UG/KG	0.735 U	0.727 U	0.681 U
Alpha Endosulfan	2400	24000	102000	UG/KG	1.76 U	1.74 U	1.63 U
Beta Bhc (Beta Hexachlorocyclohexane)	36	360	90	UG/KG	1.76 U	1.74 U	1.63 U
Beta Endosulfan	2400	24000	102000	UG/KG	1.76 U	1.74 U	1.63 U
Chlordane	--	--	--	UG/KG	14.3 U	14.2 U	13.3 U
cis-Chlordane	94	4200	2900	UG/KG	2.21 U	0.641 J	2.04 U
Delta BHC (Delta Hexachlorocyclohexane)	40	100000	250	UG/KG	1.76 U	1.74 U	1.63 U
Dieldrin	5	200	100	UG/KG	1.1 U	1.09 U	1.02 U
Endosulfan Sulfate	2400	24000	1000000	UG/KG	0.735 U	0.727 U	0.681 U
Endrin	14	11000	60	UG/KG	0.735 U	0.727 U	0.681 U
Endrin Aldehyde	--	--	--	UG/KG	2.21 U	2.18 U	2.04 U
Endrin Ketone	--	--	--	UG/KG	1.76 U	1.74 U	1.63 U
Gamma Bhc (Lindane)	100	1300	100	UG/KG	0.735 U	0.727 U	0.681 U
Heptachlor	42	2100	380	UG/KG	0.882 U	0.872 U	0.817 U
Heptachlor Epoxide	--	--	--	UG/KG	3.31 U	3.27 U	3.06 U
Methoxychlor	--	--	--	UG/KG	3.31 U	3.27 U	3.06 U
P,P'-DDD	**3.3**	13000	14000	UG/KG	1.76 U	**61.8**	1.09 J
P,P'-DDE	**3.3**	8900	17000	UG/KG	1.98	**76.6**	1.63 U
P,P'-DDT	**3.3**	7900	136000	UG/KG	2.5 J	**513**	1.33 J
Toxaphene	--	--	--	UG/KG	33.1 U	32.7 U	30.6 U
trans-Chlordane	--	--	--	UG/KG	0.693 JPI	0.859 JPI	1.27 JPI

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 6. Summary of Pesticides and Herbicides in Soil, 1221 Spofford Avenue, Bronx, New York

				Sample Designation:	RXSB-6
				Sample Date:	04/25/2017
				Sample Depth (ft bls):	8 - 10
				Normal or Field Duplicate:	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Unit	
Aldrin	5	97	190	UG/KG	1.83 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	20	480	20	UG/KG	0.763 U
Alpha Endosulfan	2400	24000	102000	UG/KG	1.83 U
Beta Bhc (Beta Hexachlorocyclohexane)	36	360	90	UG/KG	1.83 U
Beta Endosulfan	2400	24000	102000	UG/KG	1.83 U
Chlordane	--	--	--	UG/KG	14.9 U
cis-Chlordane	94	4200	2900	UG/KG	2.29 U
Delta BHC (Delta Hexachlorocyclohexane)	40	100000	250	UG/KG	1.83 U
Dieldrin	5	200	100	UG/KG	1.14 U
Endosulfan Sulfate	2400	24000	1000000	UG/KG	0.763 U
Endrin	14	11000	60	UG/KG	0.763 U
Endrin Aldehyde	--	--	--	UG/KG	2.29 U
Endrin Ketone	--	--	--	UG/KG	1.83 U
Gamma Bhc (Lindane)	100	1300	100	UG/KG	0.763 U
Heptachlor	42	2100	380	UG/KG	0.916 U
Heptachlor Epoxide	--	--	--	UG/KG	3.43 U
Methoxychlor	--	--	--	UG/KG	3.43 U
P,P'-DDD	**3.3**	13000	14000	UG/KG	1.83 U
P,P'-DDE	**3.3**	8900	17000	UG/KG	1.83 U
P,P'-DDT	**3.3**	7900	136000	UG/KG	3.43 U
Toxaphene	--	--	--	UG/KG	34.3 U
trans-Chlordane	--	--	--	UG/KG	2.29 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
FD - Duplicate sample
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Red data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 7. Summary of Volatile Organic Compounds in Sub-Slab and Soil Vapor, 1221 Spofford Avenue, Bronx, New York

Sample Designation:		RXSS-1	RXSV-1	RXSV-2
Sample Date:		04/27/2017	04/26/2017	04/26/2017
Parameter	Unit			
1,1,1-Trichloroethane	UG/M3	90.6 U	1.09 U	1.09 U
1,1,2,2-Tetrachloroethane	UG/M3	114 U	1.37 U	1.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	127 U	1.53 U	1.53 U
1,1,2-Trichloroethane	UG/M3	90.6 U	1.09 U	1.09 U
1,1-Dichloroethane	UG/M3	67.2 U	0.809 U	0.809 U
1,1-Dichloroethene	UG/M3	65.8 U	0.793 U	0.793 U
1,2,4-Trichlorobenzene	UG/M3	123 U	1.48 U	1.48 U
1,2,4-Trimethylbenzene	UG/M3	81.6 U	**2.26**	**1.51**
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	128 U	1.54 U	1.54 U
1,2-Dichlorobenzene	UG/M3	99.8 U	1.2 U	1.2 U
1,2-Dichloroethane	UG/M3	67.2 U	0.809 U	0.809 U
1,2-Dichloropropane	UG/M3	76.7 U	0.924 U	0.924 U
1,2-Dichlorotetrafluoroethane	UG/M3	116 U	1.4 U	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	81.6 U	**1.09**	0.983 U
1,3-Butadiene	UG/M3	36.7 U	0.442 U	0.442 U
1,3-Dichlorobenzene	UG/M3	99.8 U	1.2 U	1.2 U
1,4-Dichlorobenzene	UG/M3	99.8 U	1.2 U	1.2 U
1,4-Dioxane (P-Dioxane)	UG/M3	59.8 U	0.721 U	0.721 U
2,2,4-Trimethylpentane	UG/M3	77.5 U	**2.67**	0.934 U
2-Hexanone	UG/M3	68 U	**1.2**	**31.1**
4-Ethyltoluene	UG/M3	81.6 U	0.983 U	0.983 U
Acetone	UG/M3	197 U	**57**	**46.8**
Allyl Chloride (3-Chloropropene)	UG/M3	52 U	0.626 U	0.626 U
Benzene	UG/M3	**377**	**2.62**	**0.703**
Benzyl Chloride	UG/M3	86 U	1.04 U	1.04 U
Bromodichloromethane	UG/M3	111 U	1.34 U	1.34 U
Bromoform	UG/M3	172 U	2.07 U	2.07 U
Bromomethane	UG/M3	64.5 U	0.777 U	0.777 U
Carbon Disulfide	UG/M3	51.7 U	**16.6**	**1.86**
Carbon Tetrachloride	UG/M3	104 U	1.26 U	1.26 U
Chlorobenzene	UG/M3	76.4 U	0.921 U	0.921 U
Chloroethane	UG/M3	43.8 U	0.528 U	0.528 U
Chloroform	UG/M3	81.1 U	**2.25**	0.977 U
Chloromethane	UG/M3	34.3 U	0.413 U	0.413 U
Cis-1,2-Dichloroethylene	UG/M3	65.8 U	0.793 U	**0.956**
Cis-1,3-Dichloropropene	UG/M3	75.4 U	0.908 U	0.908 U

Table 7. Summary of Volatile Organic Compounds in Sub-Slab and Soil Vapor, 1221 Spofford Avenue, Bronx, New York

Sample Designation:		RXSS-1	RXSV-1	RXSV-2
Sample Date:		04/27/2017	04/26/2017	04/26/2017
Parameter	Unit			
Cyclohexane	UG/M3	**20200**	**1.66**	0.688 U
Dibromochloromethane	UG/M3	141 U	1.7 U	1.7 U
Dichlorodifluoromethane	UG/M3	82.1 U	**1.82**	**1.66**
Ethanol	UG/M3	780 U	9.42 U	**15.7**
Ethyl Acetate	UG/M3	149 U	1.8 U	1.8 U
Ethylbenzene	UG/M3	72.1 U	**1.38**	**1.54**
Hexachlorobutadiene	UG/M3	177 U	2.13 U	2.13 U
Isopropanol	UG/M3	102 U	**1.31**	1.23 U
m,p-Xylene	UG/M3	144 U	**3.74**	**5.08**
Methyl Ethyl Ketone (2-Butanone)	UG/M3	122 U	**2.94**	**255**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	170 U	2.05 U	2.05 U
Methylene Chloride	UG/M3	144 U	1.74 U	1.74 U
N-Heptane	UG/M3	68 U	**3.2**	**1.53**
N-Hexane	UG/M3	58.5 U	**4.26**	**0.969**
O-Xylene (1,2-Dimethylbenzene)	UG/M3	72.1 U	**1.08**	**1.49**
Propylene	UG/M3	**181**	NA	NA
Styrene	UG/M3	70.7 U	**5.28**	**3.44**
Tert-Butyl Alcohol	UG/M3	NA	**4.91**	1.52 U
Tert-Butyl Methyl Ether	UG/M3	59.8 U	0.721 U	0.721 U
Tetrachloroethylene (PCE)	UG/M3	113 U	**5.15**	1.36 U
Tetrahydrofuran	UG/M3	122 U	1.47 U	1.47 U
Toluene	UG/M3	62.6 U	**11.4**	**8.44**
Trans-1,2-Dichloroethene	UG/M3	65.8 U	0.793 U	0.793 U
Trans-1,3-Dichloropropene	UG/M3	75.4 U	0.908 U	0.908 U
Trichloroethylene (TCE)	UG/M3	89.2 U	1.07 U	**1.75**
Trichlorofluoromethane	UG/M3	93.3 U	**1.73**	1.12 U
Vinyl Acetate	UG/M3	292 U	NA	NA
Vinyl Bromide	UG/M3	72.6 U	0.874 U	0.874 U
Vinyl Chloride	UG/M3	42.4 U	0.511 U	0.511 U

U - Indicates that the compound was analyzed for but not detected

NA - Compound was not analyzed for by laboratory

ug/m3 - Micrograms per cubic meter

Bold data indicates that parameter was detected

Table 8a. Proposed Soil Sampling Locations

Location	Matrix	Sample Intervals	Maximum Depth	Sample Parameters	Sampling Method	Rationale
RXMW-1, RXMW-2, RXMW-6, and RXMW-7	Soil	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate soil quality in shallow soil and at the water table at the Site boundary.
RXSB-15	Soil	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate potential impacts from the historic petroleum release and to evaluate current soil quality.
RXMW-3, RXMW-4, and RXMW-5	Soil	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate soil quality in shallow soil and to evaluate potential impacts from the historic petroleum release. To evaluate current soil quality at the water table.
RXMW-9, RXMW-10, RXMW-11 and RXTGW-12	Soil	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-11, RXSB-12, RXSB-13, RXSB-14, and RXSB-17	Soil	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-16, and RXMW-8	Soil	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate potential impacts from the historic laundry facility. To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-3A, RXSB-3AN, RXSB-3AE, RXSB-3AS, and RXSB-3AW	Soil	0-2 foot interval, 2-4 foot interval, and 4-6 foot interval	6 feet	TAL Metals	SW-846 6010/6020	To evaluate soil quality in shallow soil.
If Identified: Potential Former USTs	TBD	In accordance with DER-10, section 5.5.	TBD	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate potential impacts from potential discharges.

Depths are in feet below land surface; Additional intervals may be added based on field observations
Laboratory will report to their minimum possible standards for each method (QAPP Table 2)
TCL + 30/TAL - includes TCL VOCs + 10 TICs, TCL BNA (SVOCs) + 20 TICs, TCL Pest/Herb/PCBs, TAL Metals
TCL - USEPA Contract Laboratory Program Target Compound List
TAL - USEPA Contract Laboratory Program Target Analyte List
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
PCBs - Polychlorinated Biphenyls
TICs - Tentatively Identified Compounds
TBD - To Be Determined
QA/QC samples will be collected as described in the QAPP (Appendix F)

Table 8b. Proposed Groundwater Sampling Locations

Location	Matrix	Sample Interval	Sample Parameters	Sampling Method[2]	Rationale
MW-1 through MW-6	Groundwater	Water Table	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate groundwater quality.
RXMW-1 through RXMW-11	Groundwater	Water Table	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate groundwater quality.
RXTGW-12	Groundwater	Water Table	TCL + 30/TAL	SW-846 8260B;SW-846 8270C;SW-846 8081A; SW-846 8151A;SW-846 8082;SW-846 6010/7471; SW-846 7196A; SW-846 9012B	To evaluate groundwater quality.
RXMW-2, RXMW-4 and RXMW-7	Groundwater	Water Table	1,4-dioxane, perfluorinated compounds (PFCs)	SW-8270D-SIM via Isotope Dilution; SW-537	To evaluate groundwater quality.

** Laboratory will report to their minimum possible standards for each method (QAPP Table 2)
TCL + 30/TAL - includes TCL VOCs + 10 TICs, TCL BNA (SVOCs) + 20 TICs, TCL Pest/PCBs, TAL Metals, Hexavalent Chromium
TCL - USEPA Contract Laboratory Program Target Compound List
TAL - USEPA Contract Laboratory Program Target Analyte List
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
TICs - Tentatively Identified Compounds
PCBs - Polychlorinated Biphenyls
QA/QC samples will be collected as described in the QAPP (Appendix F)
*All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs

Table 8c. Proposed Soil Vapor Sampling Locations

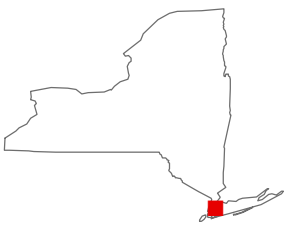
Area of Concern (AOC)	Location	Matrix	Sample Depth	Sample Parameters	Sampling Method[1]	Rationale
Soil Vapor	RXSV-4 through RXSV-14	Soil Vapor	Two feet above the groundwater table.	VOCs	TO-15	To evaluate the nature and extent of soil vapor impacts throughout the Site.
Sub-Slab Soil Vapor	RXSS-2 through RXSS-5	Sub-Slab Soil Vapor	Directly beneath the exisitng building floor slab.	VOCs	TO-15	To evaluate the nature and extent of sub-slab soil vapor impacts beneath the exisiting building.

** Laboratory will report to their minimum possible standards for each method (QAPP Table 2)
VOCs - Volatile Organic Compounds
QA/QC samples will be collected as described in the QAPP (Appendix F)

FIGURES

1. Site Location Map
2. Site Plan with Adjacent Property Owners
3. Site Plan
4. Groundwater Exceedances
5. Soil Vapor Detections
6. Proposed Sample Locations

QUADRANGLE LOCATION



N

1,000 0 1,000 2,000

Feet

Title:

SITE LOCATION MAP

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.P.G.	Date: 16JUN17
Prepared by: M.R.	Scale: AS SHOWN
Project Mgr: J.P.G.	Project: 2611.0002Y000
File: 2611.0002Y104.1.mxd	

FIGURE 1

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N

LEGEND

- **A** — 1221 SPOFFORD AVENUE, (AKA 707 BARRETTO STREET), BLOCK 2738, LOT 35 FORMER JUVENILE DETENTION CENTER OWNER: CITY OF NEW YORK
- **B** — 1320 LAFAYETTE AVENUE, BLOCK 2738, LOT 1. OWNERS CORPUS CHRISTI MONASTERY
- **C** — 711 MANDIA STREET, BLOCK 2763, LOT 29, LA PENINSULA COMMUNITY ORGANIZATION, INC. HEAD START. OWNER: CITY OF NEW YORK
- **D** — 765 MANIDA STREET, BLOCK 2763, LOTS 1&3 HUNTS POINT RECREATION CENTER/ JULIO CARBALLO FIELDS. OWNER: DEPARTMENT OF GENERAL SERVICES
- **E** — 1165 BURNETT PLACE, BLOCK 2737, LOT 102. OWNER: ELRO II, INC
- **F** — 1176 BURNETT PLACE, BLOCK 2737, LOT 29. OWNER: NEW YORK SPORT FOUNDATION
- **G** — 709 TIFFANY STREET, BLOCK 2737, LOT 130. OWNER: SAKB REALTY CORP.
- **H** — 1195 SPOFFORD AVENUE, BLOCK 2737, LOT 134. OWNER: BISOLA DIST
- **I** — 1202 SPOFFORD AVENUE, BLOCK 2765, LOT 78. OWNER: 1202 REALTY ASSOCIATE
- **J** — 667 CASANOVA STREET, BLOCK 2765, LOT 79. OWNER: HUNTS POINT HOUSING DEVELOPMENT FUND CORP.
- **K** — 1220 SPOFFORD AVENUE, BLOCK 2765, LOT 138. OWNER: NUNZIO DEL FRECCO REALTY
- **L** — 1230 SPOFFORD AVENUE, BLOCK 2765, LOT 140. OWNER: 1230 SPOFFORD AVE HDF
- **M** — 670 BARRETTO STREET, BLOCK 2765, LOT 198. OWNER: MELSY REALTY CORP.

SITE BOUNDARY

50 0 50 100 Feet

Title:

SITE PLAN WITH ADJACENT PROPERTY OWNERS

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.P.G.	Date: 16JUN17
Prepared by: M.R.	Scale: AS SHOWN
Project Mgr: J.P.G.	Project: 2611.0002Y000
File: 2611.0002Y104.2.mxd	

FIGURE 2

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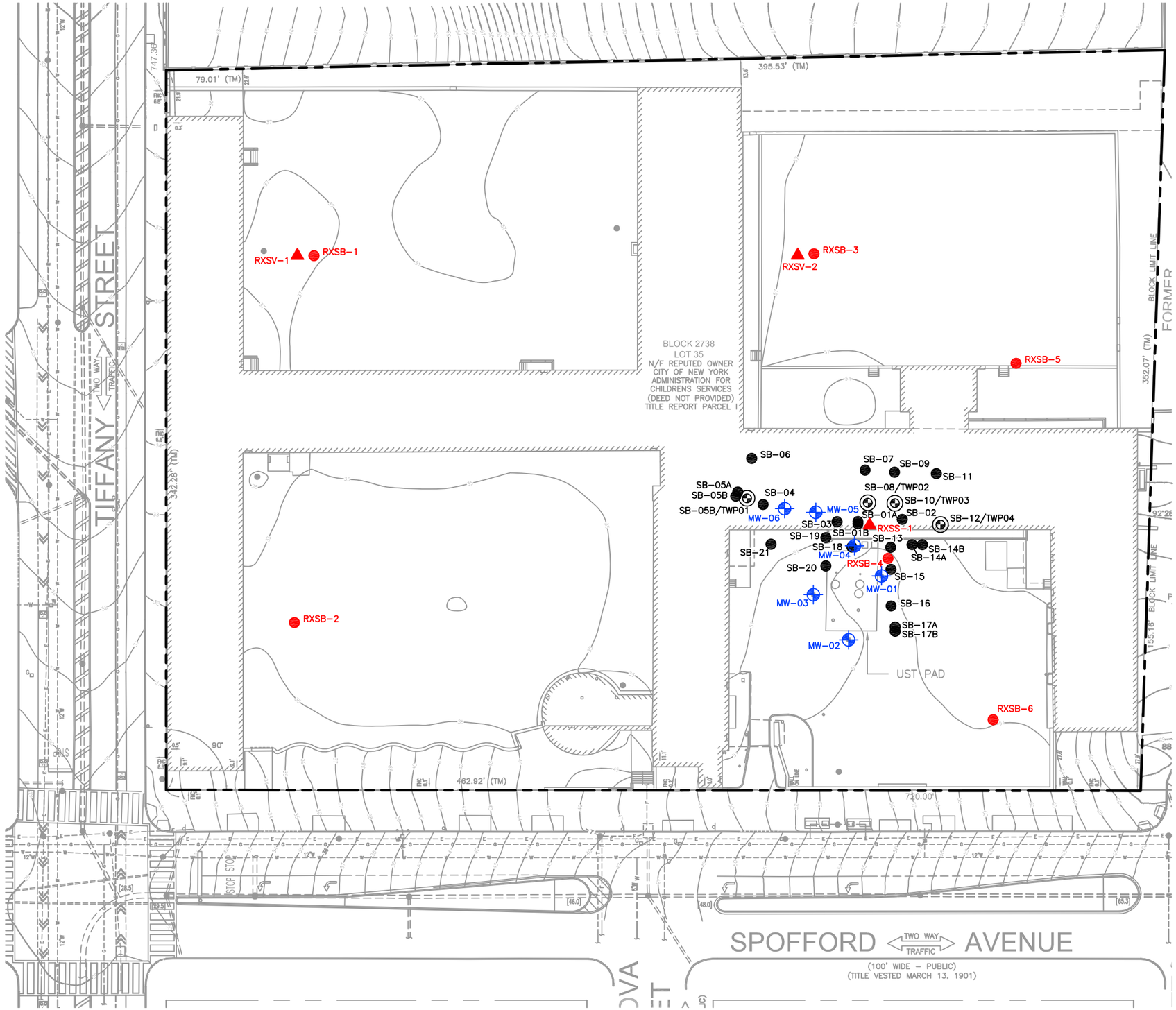

LEGEND

- SITE BOUNDARY
- SB-06 — SOIL BORING LOCATION FROM LOUIS BERGER AND ASSOC., P.C., 2009 INVESTIGATION
- SB-08/TWP02 — COLOCATED SOIL BORING AND TEMPORARY WELL LOCATION FROM LOUIS BERGER AND ASSOC., P.C., 2009 INVESTIGATION
- MW-03 — MONITORING WELL LOCATION INSTALLED BY URS 2014
- RXSB-3 — APPROXIMATE SOIL BORING LOCATION FROM ROUX ASSOCIATES 2017 INVESTIGATION
- RXSS-1 / RXSV-2 — APPROXIMATE SUB SLAB/SOIL VAPOR POINT FROM ROUX ASSOCIATES 2017 INVESTIGATION

50' 0 50'

Title:

SITE PLAN

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.S.	Date: 15JUN17	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	3
Project Mgr: F.C.	Project: 2611.0002Y000	
File: 2611.0002Y104.01.DWG		

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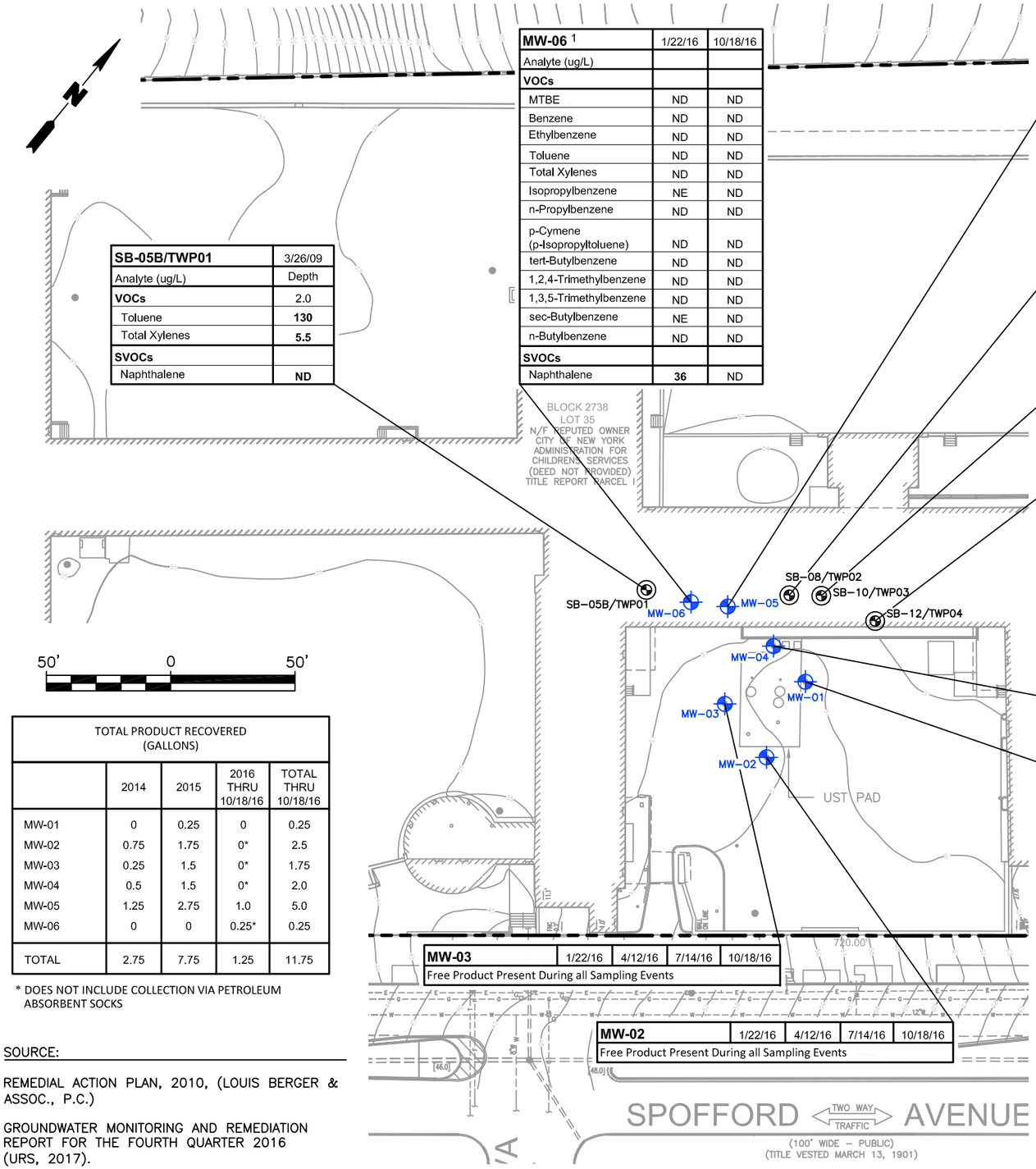

SB-05B/TWP01	3/26/09
Analyte (ug/L)	Depth
VOCs	2.0
Toluene	**130**
Total Xylenes	**5.5**
SVOCs	
Naphthalene	**ND**

MW-06 [1]	1/22/16	10/18/16
Analyte (ug/L)		
VOCs		
MTBE	ND	ND
Benzene	ND	ND
Ethylbenzene	ND	ND
Toluene	ND	ND
Total Xylenes	ND	ND
Isopropylbenzene	NE	ND
n-Propylbenzene	ND	ND
p-Cymene (p-Isopropyltoluene)	ND	ND
tert-Butylbenzene	ND	ND
1,2,4-Trimethylbenzene	ND	ND
1,3,5-Trimethylbenzene	ND	ND
sec-Butylbenzene	NE	ND
n-Butylbenzene	ND	ND
SVOCs		
Naphthalene	**36**	ND

MW-05	1/22/16	4/12/16	7/14/16	10/18/16
Free Product Present During all Sampling Events				

SB-08/TWP02	3/26/09
Analyte (ug/L)	Depth
VOCs	2.0
Toluene	**310**
1,2,4-Trimethylbenzene	**22**
1,3,5-Trimethylbenzene	**9.1**
SVOCs	
Naphthalene	**ND**

SB-10/TWP03	3/26/09
Analyte (ug/L)	Depth
VOCs	2.0
Toluene	**190**
1,2,4-Trimethylbenzene	**9.4**
SVOCs	
Naphthalene	**12**
TPH	2,700

SB-12/TW04	3/26/09
Analyte (ug/L)	Depth
VOCs	2.0
Benzene	**14**
Ethylbenzene	**6.1**
Toluene	**43**
Total Xylenes	**8**
sec-Butylbenzene	**6.5**
SVOCs	**NE**
TPH	6,500

MW-04	1/22/16	4/12/16	7/14/16	10/18/16
Free Product Present During all Sampling Events				

MW-01	1/22/16	4/12/16	7/14/16	10/18/16
Analyte (ug/L)				
VOCs				
MTBE	ND	ND	ND	ND
Benzene	**3**	**2**	NE	**3.3**
Ethylbenzene	**63**	**47**	**32**	**67.9**
Toluene	ND	ND	ND	ND
Total Xylenes	**66**	**33**	**22**	**79.7**
Isopropylbenzene	**13**	**10**	**9**	**17.2**
n-Propylbenzene	**22**	**18**	**15**	**30.1**
p-Cymene (p-Isopropyltoluene)	**7**	**6**	NE	**9.1**
tert-Butylbenzene	ND	ND	ND	ND
1,2,4-Trimethylbenzene	**250 D**	**170**	**150**	**313**
1,3,5-Trimethylbenzene	**64**	**46**	**36**	**70**
sec-Butylbenzene	**6**	NE	NE	ND
n-Butylbenzene	**15**	**13**	**7**	**12.2**
SVOCs				
Naphthalene	**82**	**28**	**23**	**112**

MW-03	1/22/16	4/12/16	7/14/16	10/18/16
Free Product Present During all Sampling Events				

MW-02	1/22/16	4/12/16	7/14/16	10/18/16
Free Product Present During all Sampling Events				

TOTAL PRODUCT RECOVERED (GALLONS)

	2014	2015	2016 THRU 10/18/16	TOTAL THRU 10/18/16
MW-01	0	0.25	0	0.25
MW-02	0.75	1.75	0*	2.5
MW-03	0.25	1.5	0*	1.75
MW-04	0.5	1.5	0*	2.0
MW-05	1.25	2.75	1.0	5.0
MW-06	0	0	0.25*	0.25
TOTAL	2.75	7.75	1.25	11.75

* DOES NOT INCLUDE COLLECTION VIA PETROLEUM ABSORBENT SOCKS

SOURCE:

REMEDIAL ACTION PLAN, 2010, (LOUIS BERGER & ASSOC., P.C.)

GROUNDWATER MONITORING AND REMEDIATION REPORT FOR THE FOURTH QUARTER 2016 (URS, 2017).

LEGEND

- SITE BOUNDARY
- MW-03 — MONITORING WELL LOCATION INSTALLED BY URS, 2014
- SB-08/TWP02 — COLOCATED SOIL BORING AND TEMPORARY WELL LOCATION FROM LOUIS BERGER AND ASSOC., P.C., 2009 INVESTIGATION

Parameter	Standards* (µg/L)
VOCs	
MTBE	10
Benzene	1
Ethylbenzene	5
Toluene	5
Total Xylenes	5
Isopropylbenzene	5
n-Propylbenzene	5
p-Cymene (p-Isopropyltoluene)	5
tert-Butylbenzene	5
1,2,4-Trimethylbenzene	5
1,3,5-Trimethylbenzene	5
sec-Butylbenzene	5
n-Butylbenzene	5
SVOCs	
Naphthalene	10

CONCENTRATIONS IN µg/L

µg/L – MICROGRAMS PER LITER
* – NYSDEC AWQSGVS
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AWQSGVS – AMBIENT WATER–QUALITY STANDARDS AND GUIDANCE VALUES
– – NOT DETECTED ABOVE NYSDEC AWQSGV
B – FOUND IN LABORATORY BLANK
E – EXCEEDS CALIBRATION LIMIT
D – DILUTION
J – ESTIMATED VALUE
DUP – DUPLICATE SAMPLE
VOCS – VOLATILE ORGANIC COMPOUNDS
SVOCS – SEMIVOLATILE ORGANIC COMPOUNDS
NE – NO EXCEEDANCES
ND – NO DETECTION
BOLD – EXCEEDS AWQSGVS

NOTE

1. FREE PRODUCT PRESENT IN MW–06 DURING SAMPLING EVENTS ON 4/12/16 AND 7/14/16.

Title:

GROUNDWATER EXCEEDANCES

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:
THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.S.	Date: 06NOV17	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	4
Project Mgr: F.C.	Project: 2611.0002Y000	
File: 2611.0002Y104.02.DWG		

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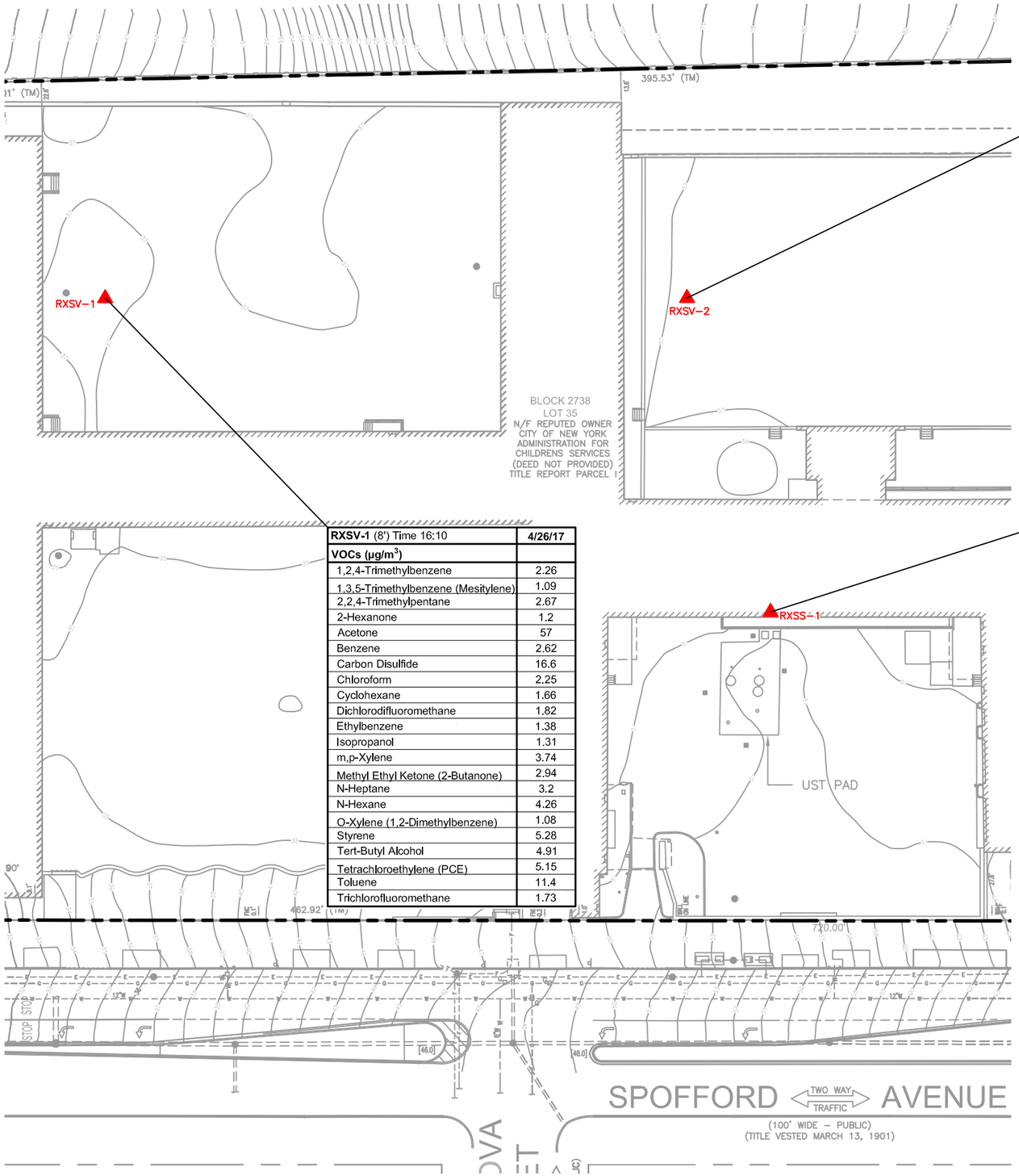

RXSV-2 (8') Time 15:16	4/26/17
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	1.51
2-Hexanone	31.1
Acetone	46.8
Benzene	0.703
Carbon Disulfide	1.86
Cis-1,2-Dichloroethylene	0.956
Dichlorodifluoromethane	1.66
Ethanol	15.7
Ethylbenzene	1.54
m,p-Xylene	5.08
Methyl Ethyl Ketone (2-Butanone)	255
N-Heptane	1.53
N-Hexane	0.969
O-Xylene (1,2-Dimethylbenzene)	1.49
Styrene	3.44
Toluene	8.44
Trichloroethylene (TCE)	**1.75**

RXSV-1 (8') Time 16:10	4/26/17
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.26
1,3,5-Trimethylbenzene (Mesitylene)	1.09
2,2,4-Trimethylpentane	2.67
2-Hexanone	1.2
Acetone	57
Benzene	2.62
Carbon Disulfide	16.6
Chloroform	2.25
Cyclohexane	1.66
Dichlorodifluoromethane	1.82
Ethylbenzene	1.38
Isopropanol	1.31
m,p-Xylene	3.74
Methyl Ethyl Ketone (2-Butanone)	2.94
N-Heptane	3.2
N-Hexane	4.26
O-Xylene (1,2-Dimethylbenzene)	1.08
Styrene	5.28
Tert-Butyl Alcohol	4.91
Tetrachloroethylene (PCE)	5.15
Toluene	11.4
Trichlorofluoromethane	1.73

RXSS-1 (16') Time 12:34	4/27/17
VOCs (µg/m³)	
Benzene	377
Cyclohexane	20200
Propylene	181

LEGEND

- SITE BOUNDARY
- RXSS–1 / RXSV–2 — APPROXIMATE SUB SLAB/SOIL VAPOR POINT FROM ROUX ASSOCIATES 2017 INVESTIGATION

NYSDOH CEH BEEI Soil Vapor Intrusion Guidance of May 2017			
Matrix A: Carbon tetrachloride, trichloroethene, cis-1,2-Dichloroethene, 1,1-Dichloroethene			
Sub-Slab Vapor Concentration	**Indoor Air Concentration**		
	< 0.2	0.2 to <1	1+
<6	No Action	No Action	Resample or Mitigate
6 to < 60	No Action	Monitor	Mitigate
60	Mitigate	Mitigate	Mitigate
Matrix B: Tetrachloroethene, 1,1,1-Trichloroethane, Methylene Chloride			
Sub-Slab Vapor Concentration	**Indoor Air Concentration**		
	<3	3 to <10	10+
<100	No Action	No Action	Resample or Mitigate
100 to <1000	No Action	Monitor	Mitigate
1000	Mitigate	Mitigate	Mitigate
Matrix C: Vinyl chloride			
Sub-Slab Vapor Concentration	**Indoor Air Concentration**		
	< 0.2	0.2+	
<6	No Action	Resample or Mitigate	
6 to < 60	Monitor	Mitigate	
60	Mitigate	Mitigate	

CONCENTRATIONS IN µg/m³

µg/m³ – MICROGRAMS PER CUBIC METER

VOCs – VOLATILE ORGANIC COMPOUNDS

NYSDOH – NEW YORK STATE DEPARTMENT OF HEALTH

CEH – CENTER FOR ENVIRONMENTAL HEALTH

BEEI – BUREAU OF ENVIRONMENTAL EXPOSURE INVESTIGATION

BOLD – RESAMPLE OR MITIGATE

50' 0 50'

NOTE

1. FOR APPLICATION OF SOIL VAPOR RESULTS TO THE NYSDOH MATRIX GUIDANCE WITHOUT HAVING INDOOR AIR SAMPLES RESULTS, ACTION THRESHOLD ASSUMES NO ATTENUATION FACTOR, SOIL VAPOR CONCENTRATION ALSO APPLIES TO INDOOR AIR.
2. SAMPLE DEPTH IN FEET BELOW LAND SURFACE AND SAMPLING TIME PROVIDED FOR EACH SAMPLING LOCATION.

Title:

SOIL VAPOR DETECTIONS

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.S.	Date: 06NOV17	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	5
Project Mgr: F.C.	Project: 2611.0002Y000	
File: 2611.0002Y104.02.DWG		

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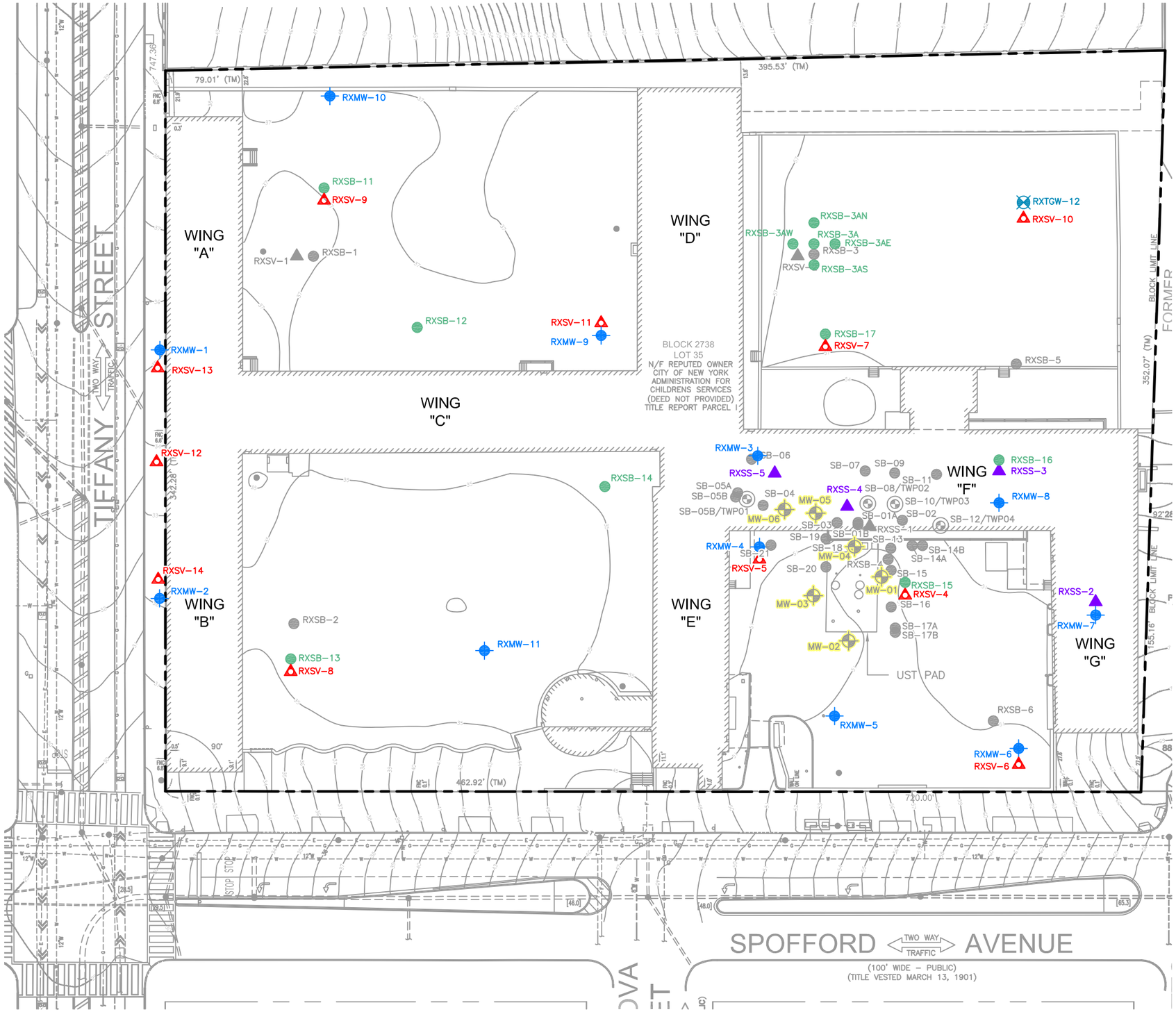

LEGEND

- SITE BOUNDARY
- RXMW-1 — PROPOSED SOIL BORING AND GROUNDWATER WELL LOCATION
- RXTGW-11 — PROPOSED SOIL BORING AND TEMPORARY GROUNDWATER WELL LOCATION (OVERBURDEN)
- RXSB-15 — PROPOSED SOIL BORING LOCATION
- RXSV-4 — PROPOSED SOIL VAPOR LOCATION
- RXSS-2 — PROPOSED SUB-SLAB SOIL VAPOR LOCATION
- SB-06 — SOIL BORING LOCATION FROM URS 2009 INVESTIGATION
- SB-08/TWP02 — COLOCATED SOIL BORING AND TEMPORARY WELL LOCATION FROM URS 2009 INVESTIGATION
- MW-03 — MONITORING WELL LOCATION INSTALLED BY LOUIS BERGER AND ASSOC., P.C., 2014
- RXSB-3 — APPROXIMATE SOIL BORING LOCATION FROM ROUX ASSOCIATES 2017 INVESTIGATION
- RXSS-1 / RXSV-2 — APPROXIMATE SUB SLAB/SOIL VAPOR POINT FROM ROUX ASSOCIATES 2017 INVESTIGATION
- MW-06 — PROPOSED MONITORING WELL RESAMPLING

50' 0 50'

Title:

PROPOSED SAMPLE LOCATIONS

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:
THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.S.	Date: 15JAN18	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	6
Project Mgr: F.C.	Project: 2611.0002Y000	
File: 2611.0002Y104.01.DWG		

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APPENDICES

(Provided on CD in Bound Copy)

A. Field Sampling Plan
B. Quality Assurance Project Plan
C. Site Specific Health and Safety Plan
D. Community Air Monitoring Plan

APPENDIX A

Field Sampling Plan

January 15, 2018

FIELD SAMPLING PLAN

1221 Spofford Avenue
Tax Lot 35 of Tax Block 2738
Bronx, New York

Prepared for

THE PENINSULA JV, LLC
111 8th Avenue
New York, New York 10011

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

TABLE OF CONTENTS

TABLES

ATTACHMENTS

1.0 INTRODUCTION

Roux Associates has developed this Field Sampling Plan (FSP) to describe in detail the field sampling methods to be used during performance of the Remedial Investigation (RI) at 1221 Spofford Avenue, Bronx, New York (Site). The Peninsula Redevelopment Project (Project) consists of the demolition of the former Spofford Juvenile Detention Center and ACS Child Care Center. These facilities will be replaced with a vibrant live-work campus known as The Peninsula. The Peninsula includes the construction of a vibrant live-work campus featuring affordable housing, community space, open/recreational space, industrial space, and retail space. The entire Site encompasses an area of approximately 3.8 acres which is planned to be investigated, remediated and redeveloped under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP).

The FSP was prepared in accordance with directives provided in the DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) issued by the New York State Department of Environmental Conservation (NYSDEC), as well as 6 NYCRR Part 375 and provides guidelines and procedures to be followed by field personnel during performance of the RI. Information contained in this FSP relates to sampling objectives, sampling locations, sampling frequencies, sample designations, sampling equipment, sample handling, sample analysis, and decontamination.

2.0 SAMPLING OBJECTIVES

The objective of the proposed sampling is to determine the nature and extent of the known contamination on Site, to evaluate any additional areas of concern (AOCs) and to obtain a current representation of the environmental conditions at the Site.

Roux Associates has performed a preliminary Site reconnaissance and has identified AOCs. These areas will be targeted during the RI to rule out any impacts. An inspection of the existing Site conditions will be conducted to determine final locations of soil borings and monitoring wells based on actual field conditions.

The sampling procedures associated with characterization of soil, groundwater, and soil vapor are discussed in detail in Section 4 of this FSP. A discussion of the data quality objectives (DQOs) is provided in the Quality Assurance Project Plan (QAPP) located in Appendix F of the RI Work Plan (RIWP).

3.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY

The media to be sampled during the RI include soil, groundwater, and soil vapor. Sampling locations, analytical suites, and frequency vary by medium. A discussion of the sampling schedule for each medium is provided below, while the assumed number of field samples to be collected for each medium, including quality control (QC) samples, is shown in Table E-1. Specifics regarding the collection of samples at each location and for each task are provided in Section 4 of this FSP.

3.1 Soil Sampling

Soil samples underlying the Site will be collected at 24 locations as shown in Figure 6 of the RIWP.

The sampling scheme and rationale for all soil samples is summarized in the table below:

Location	Depth Intervals (ft bls)	Maximum Depth	Analyses	Rationale
Monitoring Well pilot borehole (RXMW-1, RXMW-2, RXMW-6, and RXMW-7)	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL* (see Note below table)	To evaluate soil quality in shallow soil and at the water table at the Site boundary.
RXSB-15 and RXSB-17	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock	TCL+30/TAL	To evaluate potential impacts from the historic petroleum release and to evaluate current soil quality.
Monitoring Well pilot borehole (RXMW-3, RXMW-4, and RXMW-5)	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL	To evaluate soil quality in shallow soil and to evaluate potential impacts from the historic petroleum release. To evaluate current soil quality at the water table.
Monitoring Well pilot borehole (RXMW-9, and RXMW-10) Temporary Monitoring Well pilot borehole (RXTGW-11)	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock	TCL+30/TAL	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.

Location	Depth Intervals (ft bls)	Maximum Depth	Analyses	Rationale
RXSB-11, RXSB-12, RXSB-13, RXSB-14, and RXSB-18	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-16 and RXMW-8	0-2, most impacted (if encountered), and 2-foot interval above bedrock	To bedrock and/or into bedrock if the water table is not encountered in the overburden	TCL+30/TAL	To evaluate soil quality in shallow soil and above bedrock. To evaluate current soil quality at the water table.
RXSB-3A, RXSB-3AN, RXSB-3AE, RXSB-3AS, and RXSB-3AW	0-2 foot interval, 2-4 foot interval, and 4-6 foot interval	6 feet	TAL Metals	To evaluate soil quality in shallow soil.

* Note: Target Compound List (TCL) plus 30/ Target Analyte List (TAL) (TCL + 30/TAL) includes:

- TCL VOC + Tentatively identified compounds (ID TICS);
- TCL Base neutral acids (BNA)/SVOCs + 20;
- TCL Pesticides;
- TCL Herbicides;
- TCL PCBs; and
- TAL Metals (including hexavalent chromium).

If odor/ visual evidence of contamination or elevated photoionization detector (PID) readings are noted, additional samples will be collected from the interval that exhibits the highest contamination.

3.2 Groundwater Sampling

To characterize onsite groundwater flow and quality conditions, a combination of permanent and temporary groundwater monitoring wells will be installed across the Site and existing monitoring wells will be sampled. The proposed groundwater monitoring well locations are shown on Figure 6 of the RIWP.

Ten permanent groundwater monitoring wells (RXMW-1 through RXMW-10) and one temporary groundwater monitoring well (RXTGW-11) will be installed to varying depths, depending on the depth of where bedrock is encountered, across the Site. All wells will be installed bridging the water table. The permanent groundwater monitoring wells will be drilled into bedrock and the temporary groundwater monitoring wells will be drilled to a maximum depth where the top of bedrock is encountered. The six existing monitoring wells (MW-01 through MW-06) will also be sampled if determined to be in good condition during the Site reconnaissance. The proposed and existing groundwater monitoring well locations are shown on Figure 6 of the RIWP.

Groundwater samples will be collected from the monitoring wells and submitted for laboratory analysis for full TCL + 30/TAL analysis. All groundwater samples will be filtered in the field for dissolved metals. Three groundwater sampling locations (RXMW-2, RXMW-4, and RXMW-7) will also be analyzed for 1,4-dioxane, perfluorinated compounds (PFCs). Groundwater will not be collected for analysis from a monitoring well if separate-phase petroleum product is observed within that monitoring well; however, the separate phase-petroleum product will be sampled and submitted to the analytical laboratory identification. Monitoring well installation and groundwater sampling procedures are outlined below in Section 4.2.

3.3 Soil Vapor Sampling

Soil vapor samples (RXSV-4 through RXSV-14) and sub-slab samples (RXSS-2 through RXSS-5) will be collected during the RI to evaluate soil vapor conditions at the Site. All soil vapor samples will be collected in accordance with the October 2006 New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance). All soil vapor samples will be collected approximately two feet above the water table.

Eleven soil vapor samples (RXSV-4 through RXSV-14) will be collected from temporary soil vapor points from borings installed using a Geoprobe®. New Teflon®-lined tubing will be attached to an expendable soil vapor sampling point with a 6-inch stainless steel screen inside the rods, to prevent infiltration of ambient air. The soil vapor points will be backfilled with #2 Morie sand to approximately one foot above the screen. The remainder of the borehole will be backfilled with a concrete/bentonite slurry to grade.

Four sub-slab vapor samples (RXSS-2 through RXSS-5) will be collected from temporary sub-slab vapor points constructed of Teflon®-lined tubing attached to 6-inch stainless steel screens installed directly beneath the existing floor slab. Each location will be sealed with a bentonite slurry to prevent infiltration of ambient air.

All soil vapor samples will be collected using pre-cleaned 2.7-liter summa canisters with regulators calibrated to collect samples over a 2-hour period and analyzed using USEPA Method TO-15 for VOCs. A helium tracer gas test will be performed on each vapor point prior to sampling in accordance with the procedures outlined in the NYSDOH Guidance. The proposed soil vapor sampling locations are shown on Figure 6 of the RIWP.

4.0 FIELD SAMPLING PROCEDURES

This section provides a detailed discussion of the field procedures to be used during sampling of the various media being evaluated as part of the RI (i.e., soil, groundwater, and soil vapor). The locations are shown on Figure 6 of the RIWP and additional information including intervals to be sampled and sample rationale is provided in Tables 8a, 8b, and 8c of the RIWP. Additional details regarding sampling procedures and protocols are described in Roux Associates' relevant Standard Operating Procedures (SOPs), which are provided in Attachment E-1.

4.1 Soil Sampling and Monitoring Well Installation

Details for the collection of soil samples and the installation of monitoring wells are provided below. Boreholes will be pre-cleared to five feet blow land surface using non-intrusive methods prior to advancement of soil borings and monitoring well pilot-boreholes to verify the absence of utilities and or other subsurface features or AOCs (e.g., buried tanks, piping). Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no greater than 10 feet away from the original proposed location. Should the sampling location need to be located at a distance greater than 10 feet from the original proposed location due to access constraints, Roux Associates will contact the NYSDEC case manager to confirm.

4.1.1 Soil Sampling

Soil borings will be advanced using a Sonic Drill Rig. Samples of the soil profile will be collected continuously from land surface to a maximum depth of up to five feet into bedrock, as shown in Table 8a of the RIWP.

The soil from each four or five-foot interval will be observed for lithology and evidence of contamination (e.g., staining, odors, and/or visible free product) and placed immediately thereafter into large Zip-loc™ bags for recording headspace using a PID. After a minimum of 15 minutes for equilibration with the headspace in the Zip-loc™ bag, each sample will be screened for organic vapors using a PID equipped with a 10.6 eV lamp. Samples for possible VOC analysis will be placed in a laboratory-supplied jar or encore sampler prior to screening, due to the potential for loss of VOCs through volatilization. Soil samples will be collected according to Table 8a of the RIWP. These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates' SOPs.

Following sample collection, boreholes will be backfilled with soil cuttings with an upper bentonite plug and capped with concrete. Contaminated soil cuttings will be places in sealed and labeled DOT-approved 55-gallon drums pending characterization and off-site disposal at a permitted facility.

4.1.2 Monitoring Well Installation

Following soil sampling activities, monitoring wells will be installed at soil boring locations bridging the water table or will be drilled into bedrock if the water table is not encountered in the overburden. Monitoring wells will be constructed of 2-inch-inside-diameter, Schedule 40 polyvinyl chloride (PVC) casing and, 0.020-inch slot, machined screen. Well screens will be 10 feet long, and will be installed with three feet above and seven feet below the water table. A sand pack will be placed around the well screen, extending two feet above the top of the screened zone. Once the driller confirms the depth of the sand pack, a minimum two-foot-thick bentonite pellet seal will be placed above the sand pack. Once the pellets have been allowed to hydrate, a cement-bentonite grout will be pumped into the remaining annular space from the bottom up using a tremie pipe lowered to just above the bentonite seal. The wells will be completed using locking well plugs, and flush mounted, bolt down, watertight, manhole covers cemented into place.

Each newly installed monitoring well and the existing well will be developed to remove any fine-grained material in the vicinity of the well screen and to promote hydraulic connection with the aquifer. The wells will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has a turbidity below 50 Nephelometric turbidity units (NTUs).

All monitoring wells will be surveyed by a licensed New York State surveyor to obtain horizontal and vertical survey coordinates.

4.2 Groundwater Sampling

Groundwater samples will be collected no sooner than one week following development of the wells. Prior to sampling, depth to water will be measured at each well using an electronic oil/water level meter with an accuracy of +/-0.01 feet. All wells will then be purged and sampled

using a submersible pump, or an alternative method, depending on the observed depth to groundwater and logistical issues. Purging and sampling will be performed consistent with USEPA low-flow sampling requirements. Field parameters (i.e., pH, dissolved oxygen, ORP, etc. as described in the USEPA low-flow sampling requirements) will be collected using a water quality meter with flow-through cell until parameters stabilized before samples are collected. Samples will be analyzed for TCL + 30/TAL, both filtered and unfiltered metals. All groundwater grab samples will be filtered in the field for metals.. Three groundwater sampling locations (RXMW-2, RXMW-4, and RXMW-7) will also be analyzed for 1,4-dioxane, perfluorinated compounds (PFCs).

Disposable nitrile gloves will be worn at all times. Further, a new pair of nitrile gloves will be donned prior to the following activities at each sample location:

- Decontamination of re-usable sampling equipment.
- Contact with sample bottles or water containers.
- Insertion of anything into the well (e.g., tubing, pump, bailer).
- Insertion of silicon tubing into the peristaltic pump.
- Sample collection, at completion of monitoring well purging.
- Handling of any quality assurance/quality control samples including field blanks and equipment blanks.

New gloves shall also be donned after the handling of any non-dedicated sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

Teflon free dedicated tubing will be used during groundwater sample collection. PFC samples will be collected first, prior to collecting samples for any other parameters. The sample bottle cap will not be placed on any surface during sample collection and contact with the inside of the sample bottle or cap will be avoided. Once the PFC samples are collected, the bottles will be placed in a Zip-loc™ bag and placed in a cooler packed with loose ice. Further, EPA 537 Guidance regarding sampling of PFCs is provided in Appendix E-2.

Additional details for the collection of groundwater samples are included in the Roux Associates' SOPs. All groundwater samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates' SOPs.

4.3 Soil Vapor Sampling

Details for the collection of soil samples and the installation of soil vapor points are provided below. Locations will be pre-cleared to five feet blow land surface using non-intrusive methods to verify the absence of utilities and or other subsurface features or AOCs (e.g., buried tanks, piping). Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no greater than 10 feet away from the original proposed location. Should the sampling location need to be located at a distance greater than 10 feet from the original proposed location due to access constraints, Roux Associates will contact the NYSDEC case manager to confirm.

Eleven soil vapor samples and four sub-slab soil vapor samples will be collected during the RI to evaluate soil vapor conditions at the Site. The soil vapor samples will be collected from a two feet above the groundwater table. The sub-slab soil vapor samples will be collected from locations within the current building's basement. New Teflon lined tubing will be attached to an expendable soil vapor sampling point with a 6-inch stainless steel screen inside the rods, to prevent infiltration of ambient air. The soil vapor points will be backfilled with #2 Morie sand to approximately one foot above the screen. The remainder of the borehole will be backfilled with a cement/bentonite slurry to grade.

Prior to sample collection, the Teflon®-lined tubing will be purged of approximately two volumes of the tubing using a vacuum pump set at a rate of 0.2 liters per minute. A tracer gas (i.e., helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the borehole seal and verify that ambient air is not being drawn into the sample in accordance with the procedures outlined in the NYSDOH Guidance. Following purging and verification with the tracer gas, the tubing will be connected to the laboratory supplied six-liter SUMMA canister. All soil vapor samples will be collected using pre-cleaned 2.7-liter summa canisters with regulators calibrated to collect samples over a 2-hour period and analyzed using USEPA Method TO-15 for VOCs.

5.0 SAMPLE HANDLING AND ANALYSIS

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples as well as sample packaging and shipping procedures.

5.1 Field Sample Handling

A detailed discussion of the number and types of samples to be collected during each task, as well as the analyses to be performed can be found in Section 3.0 of this FSP. The types of containers, volumes needed, and preservation techniques for the aforementioned testing parameters are presented in Table E-2.

5.2 Sample Custody Documentation

The purpose of documenting sample custody is to confirm that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis. Specific procedures regarding sample tracking from the field to the laboratory are described in Roux Associates' SOP for Sample Handling.

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels will be pre-printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Analyst to determine whether proper custody procedures were followed during the fieldwork and to decide if additional samples are required.

All samples being shipped off-site for analysis must be accompanied by a properly completed chain of custody form (Attachment E-3). The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for laboratory pick up and/or shipment with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

5.3 Sample Shipment

Laboratory courier services may be used for sample transport on this project. However, in the event that samples are shipped to the laboratory the following procedures will apply. Sample packaging and shipping procedures are based upon USEPA specifications, as well as U.S. Department of Transportation (DOT) regulations. The procedures vary according to potential sample analytes, concentration, and matrix, and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below. Additional information regarding sample handling is provided in Roux Associates' SOP for Sample Handling.

When possible, a laboratory courier will pick up samples each day for delivery directly to the laboratory. In the event that a laboratory courier is unable to pick up the samples, all samples will be shipped within 12 hours of collection (when possible) and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment.
   - tape drain(s) of cooler shut;
   - affix "this side up" arrow labels and "fragile" labels on each cooler; and
   - place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number or analyte.
3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed with packaging material.
9. If ice is required to preserve the samples, ice cubes should be repackaged in double Zip-Lock™ bags, and placed on top of the packaging material.

10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or other carrier, as appropriate.

11. Separate chain of custody forms. Seal proper copies within a large Zip-Lock™ bag and tape to cooler. Retain copies of all forms.

12. Close lid and latch.

13. Secure each cooler using custody seals.

14. Tape cooler shut on both ends.

15. Relinquish to Federal Express or other courier service as appropriate. Retain airbill receipt for project records. (Note: All samples will be shipped for "NEXT A.M." delivery).

16. Telephone laboratory contact and provide him/her with the following shipment information:

    - sampler's name;
    - project name;
    - number of samples sent according to matrix and concentration; and
    - airbill number.

6.0 SITE CONTROL PROCEDURES

Site control procedures, including decontamination and waste handling and disposal, are discussed below.

6.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Roux Associates' SOPs for the Decontamination of Field Equipment. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

6.2 Waste Handling and Disposal

Per DER-10 Section 3.3(e)1, investigation derived soil cuttings may be disposed at the site within the borehole that generated them to within 24 inches of the surface unless:

- Free product or grossly contaminated soil, are present in the cuttings;
- The borehole will be used for the installation of a monitoring well (cuttings may only be used to backfill boreholes installed for soil sampling);
- The borehole has penetrated an aquitard, aquiclude or other confining layer; or extends significantly into bedrock;
- Backfilling the borehole with cuttings will create a significant path for vertical movement of contaminants. Soil additives (bentonite) may be added to the cuttings to reduce permeability; and
- The soil cannot fit into the borehole.

All waste materials (excess or contaminated drill cuttings, purge water, decontamination water, etc.) generated during the RI will be consolidated, and stored in appropriate labeled bulk containers [55-gallon United Nations (UN)/Department of Transportation (DOT) approved steel drums, etc.], and temporarily staged at an investigation-derived-waste storage area onsite. Roux Associates will then coordinate waste characterization and disposal by appropriate means.

TABLES

Table E-1. Remedial Investigation Field and Quality Control Sampling Summary

Sample Medium	Target Analytes	Field Samples	Replicates[1]	Trip Blanks[2]	Field Blanks[1]	Matrix Spikes[1]	Spike Duplicates[1]	Total No. of Samples
Soil	TCL VOCs +10	72	4	10	7	4	4	100
	TCL SVOCs +20	72	4	NA	7	4	4	90
	TCL Pesticides	72	4	NA	7	4	4	90
	TCL Herbicides	72	4	NA	7	4	4	90
	TCL PCBs	72	4	NA	7	4	4	90
	TAL Metals	72	4	NA	7	4	4	90
Groundwater	TCL VOCs +10	18	1	1	3	1	1	25
	1,4 Dioxane	3	1	NA	1	1	1	7
	Perfluorinated chemicals (PFCs)	3	1	NA	1	1	1	7
	TCL SVOCs +20*	18	1	NA	3	1	1	24
	TCL Pesticides	18	1	NA	3	1	1	24
	TCL Herbicides	18	1	NA	3	1	1	24
	TCL PCBs	18	1	NA	3	1	1	24
	TAL Metals*	18	1	NA	3	1	1	24
Soil Vapor	TO-15 VOCs	15	0	NA	0	0	0	15

Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.

[1] Based on 1 per 20 samples or 1 per Sample Delivery Group (3 days max)

[2] Based on 1 cooler per day

TCL - USEPA Contract Laboratory Program Target Compound List

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds

PCBs - Polychlorinated Biphenyls

TAL - USEPA Contract Laboratory Program Target Analyte List

NA - Not Applicable

*All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs.

Table E-2. Preservation, Holding Times and Sample Containers

Analysis	Matrix	Bottle Type	Preservation(a)	Holding Time(b)
Perfluorinated chemicals (PFCs) SW-846 Method 537 modified	Water	250 mL container (3 units)	Cool to 4°C 1.25 g Trizma	14 days to extract, 28 days after extraction to analyze
1,4-Dioxane EPA 8270D SIM Modified	Water	2 x 500 mL Amber glass jar	Cool to 4°C	7 days to extract, 40 days after extraction to analyze
TAL Metals (total) SW-846 6010/7471	Soil Water	2 oz glass jar, teflon lined cap 250 mL plastic, teflon lined cap	Cool to 4°C Nitric acid	180 days, Hg 28 days
TO-15	Air	2.7 liter Summa Canister	None	14 days from sample collection
Target Compound List (TCL)				
TCL Volatile Organic Compounds (VOCs) SW-846 8260B	Soil Water	3 x 5g encores 3 x 40 mL voa vial, teflon lined cap	Cool to 4°C Hydrochloric Acid	14 days from sample collection
TCL Semivolatile Organic Compounds (SVOCs) SW-846 8270D	Soil Water	4 oz glass jar, teflon lined cap 2 x 1 liter amber glass, teflon lined cap	Cool to 4°C	7 days to extract, 40 days after extraction to analyze 7 days to extract, 40 days after extraction to analyze
TCL Pesticides SW-846 8081A	Soil Water	4 oz glass jar, teflon lined cap 2 x 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days after extraction to analyze 7 days to extract, 40 days after extraction to analyze
TCL Herbicides SW-846 8051A	Soil Water	4 oz glass jar, teflon lined cap 2 x 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 daysafter extraction to analyze 7 days to extract, 40 days after extraction to analyze
TCL Polychlorinated biphenyls (PCBs) SW-846 8082	Soil Water	4 oz glass jar, teflon lined cap 2 x 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days after extraction to analyze 7 days to extract, 40 days after extraction to analyze

(a) All soil and groundwater samples to be preserved in ice during collection and transport

(b) Days from date of sample collection.

TAL - Target Analyte List

TCL - USEPA Contract Laboratory Program Target Compound List

ATTACHMENTS

E-1. Roux Associates' Standard Operating Procedure for Tasks Described in this Field Sampling Plan

E-2. EPA 537 (PFAS) Field Sampling Guidelines

E-3. Chain of Custody Form

ATTACHMENT E-1

Roux Associates' Standard Operating Procedure for Tasks Described in this Field Sampling Plan

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during drilling, and soil and water sampling. The objective of decontamination is to ensure that all drilling, and soil-sampling and water-sampling equipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements and because of variability in the requirements of individual states. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non acceptance (invalidation) of the work undertaken and data collected.

2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

2.1 The rig and all associated equipment should be properly decontaminated by the contractor before arriving at the test site.

2.2 The augers, drilling casings, rods, samplers, tools, rig, and any piece of equipment that can come in contact (directly or indirectly) with the soil, will be steam cleaned onsite prior to set up for drilling to ensure proper decontamination.

2.3 The same steam cleaning procedures will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the study.

2.4 All on-site steam cleaning (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc.

2.5 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

2.6 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federal procedures.

3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

3.1 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.

3.2 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).

3.3 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.

3.4 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.

3.5 Scrub all equipment in the bucket with a brush to remove any adhering particles.

3.6 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.

3.7 Place clean equipment on a clean plastic sheet (e.g., polyethylene)

3.8 Reassemble the cleaned sampler, as necessary.

3.9 Transfer the sampler to the driller (or helper) making sure that this individual is also wearing clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil.

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

4.1 Decontamination procedures for bailers follow:

a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.

c. Disassemble bailer (if applicable) and discard cord in an appropriate manner, and scrub each part of the bailer with a brush and solution.

d. Rinse with potable water and reassemble bailer.

e. Rinse with copious amounts of distilled or deionized water.

f. Air dry.

g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

h. Rinse bailer at least three times with distilled or deionized water before use.

4.2 Decontamination procedures for pumps follow:

a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.

c. Flush the pump and discharge hose (if not disposable) with the detergent solution, and discard disposable tubing and/or cord in an appropriate manner.

d. Flush the pump and discharge hose (if not disposable) with potable water.

e. Place the pump on clear plastic sheeting.

f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

g. Air dry.

h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

Date: May 5, 2000

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for the collection of soil samples for laboratory analysis. This SOP is applicable to soil samples collected from split-spoon samplers during drilling, hand auger samples, grab samples from stockpiled soils, surface samples, test pit samples, etc.

2.0 CONSIDERATIONS

Soil samples may be collected in either a random or biased manner. Random samples can be based on a grid system or statistical methodology. Biased samples can be collected in areas of visible impact or suspected source areas. Soil samples can be collected at the surface, shallow subsurface, or at depth. When samples are collected at depth the water content should be noted, since generally "soil sampling" is restricted to the unsaturated zone. Equipment selection will be determined by the depth of the sample to be collected. A thorough description of the sampling locations and proposed methods of sample collection should be included in the work plan.

Commonly, surface sampling refers to the collection of samples at a 0 to 6 inch depth interval. Certain regulatory agencies may define the depth interval of a surface sample differently, and this must be defined in the work plan. Collection of surface soil samples is most efficiently accomplished with the use of a stainless steel trowel or scoop. For samples at greater depths a decontaminated bucket auger or power auger may be needed to advance the hole to the point of sample collection. Another clean bucket auger should then be used to collect the sample. To collect samples at depths of greater than approximately six feet the use of a drill rig and split spoon samples will usually be necessary. In some situations, sample locations are accessed with the use of a backhoe.

3.0 MATERIALS/EQUIPMENT

a. A work plan which outlines soil sampling requirements.

b. Field notebook, field form(s), maps, chain-of-custody forms, and custody seals.

c. Decontamination supplies (including: non-phosphate, laboratory grade detergent, buckets, brushes, potable water, distilled water, regulatory-required reagents, aluminum foil, plastic sheeting, etc.).

d. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

e. Stainless steel spoons or spatulas.

f. Disposable sampling gloves.

g. Laboratory-supplied sample containers with labels.

h. Cooler with blue or wet ice.

i. Plastic sheeting.

j. Black pen and indelible marker.

k. Zip-lock bags and packing material.

l. Tape measure.

m. Paper towels or clean rags.

n. Masking and packing tape.

o. Overnight (express) mail forms.

4.0 DECONTAMINATION

All reusable sampling equipment will be thoroughly cleaned according to the decontamination SOP. Where possible, thoroughly pre-cleaned and wrapped sampling equipment should be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and plastic sheeting will be changed after each use and discarded in an appropriate manner.

5.0 PROCEDURE

5.1 Prior to collecting soil samples, ensure that all sampling equipment has been thoroughly cleaned according to the decontamination SOP. If samples are to be collected at depth, then the boring must be advanced with thoroughly cleaned equipment to the desired sampling horizon and a different thoroughly cleaned sampler must be used to collect the sample.

5.2 Using disposable gloves and a pre-cleaned, stainless steel spatula or spoon, extract the soil sample from the sampler, measure the recovery, and separate the wash from the true sample. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.

5.3 Place the sample in a laboratory-supplied, pre-cleaned sample container. This should be done as quickly as possible and this is especially important when sampling for volatile organic compounds (VOCs). Samples to be analyzed for VOCs must be collected prior to other constituents.

5.4 The sample container will be labeled with appropriate information such as, client name, site location, sample identification (location, depth, etc.), date and time of collection, and sampler's initials.

5.5 Using the remaining portion of soil from the sampler, log the sample in detail and record sediment characteristics (color, odor, moisture, texture, density, consistency, organic content, layering, grain size, etc.).

5.6 If soil samples are to be composited in the field, then equal portions from selected locations will be placed on a clean plastic sheet and homogenized. Alternately, several samples may be submitted to the laboratory for compositing by weight. The method used is dependent upon regulatory requirements. Specific compositing procedures shall be approved by the appropriate regulatory agency and described in the work plan. Samples to be analyzed for VOCs will not be composited unless required by a regulatory agency.

5.7 After the sample has been collected, labeled, and logged in detail, it is placed in a zip-lock bag and stored in a cooler at 4°C.

5.8 A chain-of-custody form is completed for all samples collected. One copy is retained and two are sent with the samples in a zip-lock bag to the laboratory. A custody seal is placed on the cooler prior to shipment.

5.9 Samples collected from Monday to Friday are to be delivered to the laboratory within 24 hours of collection. If Saturday delivery is unavailable, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if any analytes require a shorter delivery time.

5.10 The field notebook and appropriate forms should include, but not be limited to the following: client name, site location, sample location, sample depth, sample identification, date and time collected, sampler's name, method of sample collection, number and type of containers, geologic description of material, description of decontamination procedures, etc. A site map should be prepared with exact measurements to each sample location in case follow-up sampling is necessary.

5.11 All reusable sampling equipment must be thoroughly cleaned in accordance with the decontamination SOP. Following the final decontamination (after all samples are collected) the sampling equipment is wrapped in aluminum foil. Discard any gloves, foil, plastic, etc. in an appropriate manner that is consistent with site conditions.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. Thus, this SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity to as great an extent as possible. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic container should accompany glass containers if metals analysis is to be

performed along with other analyses. Likewise, other sample characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., TeflonTM) septums. Non-aqueous volatile organic samples should be collected in the same type of vials or in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., TeflonTM). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

a. Sample bottles are preserved at the laboratory prior to shipment into the field.

b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. Each sample bottle must be placed in an individual "zip-lock" bag to protect the label, and placed on ice. The bottles must be carefully packed to prevent breakage during transport. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory. Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection Agency does not like the use of

blue packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased. The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

3.0 EQUIPMENT AND MATERIALS

3.1 General equipment and materials may include, but not necessarily be limited to, the following:

a. Sample bottles of proper size and type with labels.

b. Cooler with ice (wet or blue pack).

c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.

d. Black pen and indelible marker.

e. Packing tape, "bubble wrap," and "zip-lock" bags.

f. Overnight (express) mail forms and laboratory address.

g. Health and safety plan (HASP).

h. Work plan/scope of work.

i. Pertinent SOPs for specified tasks and their respective equipment and materials.

3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:

a. Graduated pipettes.

b. Pipette bulbs.

c. Litmus paper.

d. Glass stirring rods.

e. Protective goggles.

f. Disposable gloves.

g. Lab apron.

h. First aid kit.

i. Portable eye wash station.

j. Water supply for immediate flushing of spillage, if appropriate.

k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

4.0 PROCEDURE

4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.

4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.

4.3 Collect samples in the proper manner (refer to specific sampling SOPs).

4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.

4.5 Conduct QC sampling, as required.

4.6 Seal each container carefully and place in an individual "zip lock" bag.

4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.

4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.

4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure that the sample containers and coolers are in compliance and properly labeled.

4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.

4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the sampling of ground-water monitoring wells for dissolved constituents. As part of the SOP for the sampling of ground-water monitoring wells, sample collection equipment and devices must be considered, and equipment decontamination and pre-sampling procedures (e.g., measuring water levels, sounding wells, and purging wells) must be implemented. Sampling objectives must be firmly established in the work plan before considering the above.

Valid water-chemistry data are integral to a hydrogeologic investigation that characterizes ground-water quality conditions. Water-quality data are used to evaluate both current and historic aquifer chemistry conditions, as well as to estimate future conditions (e.g., trends, migration pathways). Water-quality data can be used to construct ground-water quality maps to illustrate chemical conditions within the flow system, to generate water-quality plots to depict conditions with time and trends, and to perform statistical analyses to quantify data variability, trends, and cleanup levels.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample ground water from monitoring wells, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

a. Bailers (Teflon™ or stainless steel).

b. Pumps (centrifugal, peristaltic, bladder, electric submersible, bilge, hand-operated diaphragm, etc.).

c. Gas-displacement device(s).

d. Air-lift device(s).

e. Teflon™ tape, electrical tape.

f. Appropriate discharge hose.

g. Appropriate discharge tubing (e.g., polypropylene, teflon, etc.) if using a peristaltic pump.

h. Appropriate compressed gas if using bladder-type or gas-displacement device.

i. Portable generator and gasoline or alternate power supply if using an electric submersible pump.

j. Non-absorbent cord (e.g., polypropylene, etc.).

k. Plastic sheeting.

l. Tape measure (stainless steel, steel, fiberglass) with 0.01-foot measurement increments and chalk (blue carpenter's).

m. Electronic water-level indicators (e.g., m-scope, etc.) or electric water-level/product level indicators.

n. Non-phosphate, laboratory-grade detergent.

o. Distilled/Deionized water.

p. Potable water.

q. Paper towels, clean rags.

r. Roux Associates' field forms (e.g., daily log, well inspection checklist, sampling, etc.) and field notebook.

s. Well location and site map.

t. Well keys.

u. Stop watch, digital watch with second increments, or watch with a second hand.

v. Water Well Handbook.

w. Calculator.

x. Black pen and water-proof marker.

y. Tools (e.g., pipe wrenches, screwdrivers, hammer, pliers, flashlight, pen knife, etc.).

z. Appropriate health and safety equipment, as specified in the site health and safety plan (HASP).

aa. pH meter(s) and buffers.

bb. Conductivity meter(s) and standards.

cc. Thermometer(s).

dd. Extra batteries (meters, thermometers, flashlight).

ee. Filtration apparatus, filters, pre-filters.

ff. Plasticware (e.g., premeasured buckets, beakers, flasks, funnels).

gg. Disposable gloves.

hh. Water jugs.

ii. Laboratory-supplied sample containers with labels.

jj. Cooler(s).

kk. Ice (wet, blue packs).

ll. Masking, duct, and packing tape.

mm. Chain-of-custody form(s) and custody seal(s).

nn. Site sampling and analysis plan (SAP).

oo. Site health and safety plan (HASP).

pp. Packing material (e.g., bubble wrap)

qq. "Zip-lock" plastic bags.

rr. Overnight (express) mail forms.

3.0 DECONTAMINATION

3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the SOP for Decontamination of Field Equipment for detailed decontamination methods, summaries for bailers and pumps are provided below). Use new, clean materials when decontamination is not appropriate (e.g., non-absorbent cord, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form and in the field notebook.

a. Decontaminate a bailer by: 1) wearing disposable gloves, 2) disassembling (if appropriate) and scrubbing in a non-phosphate, laboratory-grade detergent and distilled/deionized water solution, and 3) rinsing first with potable water and then distilled/deionized water.

b. Decontaminate a pump by: 1) wearing disposable gloves, 2) flushing the pump and discharge hose (if not disposable) first with a non-phosphate, laboratory-grade detergent and potable water solution in an appropriate container (clean bucket, garbage can, or 55-gallon drum) and then with

distilled/deionized water or potable water, and 3) wiping pump-related equipment (e.g., electrical lines, cables, discharge hose) first with a clean cloth and detergent solution and then rinsing or wiping with a clean cloth and distilled/deionized water or potable water.

3.2 Note that the decontamination procedures for bailers and pumps are the minimum that must be performed. Check the work plan to determine if chemicals specified by individual state regulatory agencies must also be used for decontamination procedures (e.g., hexane, nitric acid, acetone, isopropanol, etc.).

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment before use (e.g., thermometers, pH and conductivity meters, etc.). Refer to the specific SOP for field analysis for each respective piece of equipment. Document, and initial and date the calibration procedures on the appropriate field form, in the field notebook, and in the calibration log book.

5.0 PROCEDURE

5.1 Document, and initial and date well identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook as needed.

5.2 Inspect the protective casing of the well and the well casing, and note any items of concern such as a missing lock, or bent or damaged casing(s).

5.3 Place plastic sheeting around the well to protect sampling equipment from potential cross contamination.

5.4 Remove the well cap or plug and, if necessary, clean the top of the well off with a clean rag. Place the cap or plug on the plastic sheeting. If the well is not vented, allow several minutes for the water level in the well to equilibrate. If fumes or gases are present, then diagnose these with the proper safety equipment. Never inhale the vapors.

5.5 Measure the depth to water (DTW) from the measuring point (MP) on the well using a steel tape and chalk or an electronic sounding device (m-scope). Refer to the specific SOPs for details regarding the use of a steel tape or a m-scope for measuring water levels. Calculate the water-level elevation. Document, and initial and date the information on the appropriate field form and in the field notebook.

5.6 Measuring the total depth of the well from the MP with a weighted steel tape. Calculate and record the volume of standing water in the well casing on the appropriate field form and in the field notebook.

5.7 Decontaminate the equipment used to measure the water level and sound the well with a non-phosphate, laboratory-grade detergent solution followed by a distilled/deionized water rinse.

5.8 Purge the well prior to sampling (refer to the SOP for Purging a Well). The well should be pumped or bailed to remove the volume of water specified in the work plan. Usually three to five casing volumes are removed if the recharge rate is adequate to accomplish this within a reasonable amount of time.

If the formation cannot produce enough water to sustain purging, then one of two options must be followed. These include: 1) pumping or bailing the well dry, or 2) pumping or bailing the well to "near-dry" conditions (i.e., leaving some water in the well). The option employed must be specified in the work plan and be in accordance with regulatory requirements.

If the well is purged dry, then all the standing water has been removed and upon recovery the well is ready for sampling. However, depending on the rate of recovery and the time needed to complete the sampling round, one of the following procedures may have to be implemented: 1) the well may have to be sampled over a period of more than one day; 2) the well may not yield enough water to collect a complete suite of samples and only select (most important) samples will be collected; or 3) the well may not recover which will preclude sampling. Regardless of the option that must be followed, the sampling procedure must be fully documented. When preparing to conduct a sampling round, review drilling, development and previous sampling information (if available) to identify low-yielding wells in order to purge them first, and potentially allow time for the well to recover for sampling.

5.9 Record the physical appearance of the water (i.e., color, turbidity, odor, etc.) on the appropriate field form and in the field notebook, as it is purged. Note any changes that occur during purging.

5.10 If a bailer is used to collect the sample, then:

a. Flush the decontaminated bailer three times with distilled/deionized water.

b. Tie the non-absorbent cord (polypropylene) to the bailer with a secure knot and then tie the free end of the bailer cord to the protective casing or, if possible, some nearby structure to prevent losing the bailer and cord down the well.

c. Lower the bailer slowly down the well and into the water column to minimize disturbance of the water surface. If a bottom-filling bailer is used, then do not submerge the top of the bailer; however, if a top-filling bailer is used, then submerge the bailer several feet below the water surface.

d. Remove and properly discard one bailer volume from the well to rinse the bailer with well water before sampling. Again, lower the bailer slowly down the well to the appropriate depth depending on the bailer type (as discussed above in 5.11 c). When removing the bailer from the well, do not allow the bailer cord to rest on the ground but coil it on the protective plastic sheeting placed around the well. Certain regulatory agencies require that the first bailer volume collected be utilized for the samples.

5.11 If a pump is used to collect the sample, then use the same pump used to purge the well and, if need be, reduce the discharge rate to facilitate filling sample containers and to avoid problems that can occur while filling sample containers (as listed in Number 5.14, below). Alternately, the purge pump may be removed and a thoroughly decontaminated bailer can be used to collect the sample.

5.12 Remove each appropriate container's cap only when ready to fill each with the water sample, and then replace and secure the cap immediately.

5.13 Fill each appropriate, pre-labeled sample container carefully and cautiously to prevent: 1) agitating or creating turbulence; 2) breaking the container; 3) entry of, or contact with, any other medium; and 4) spilling/splashing the sample and exposing the sampling team to contaminated water. Immediately place the filled sample container in a ice-filled (wet ice or blue pack) cooler for storage. If wet ice is used it is recommended that it be repackaged in zip-lock bags to help keep the cooler dry and the sample labels secure. Check the work plan as to whether wet ice or blue packs are specified for cooling the samples because certain regulatory agencies may specify the use of one and not the other.

5.14 "Top-off" containers for volatile organic compounds (VOCs) and tightly seal with Teflon™-lined septums held in place by open-top screw caps to prevent volatilization. Ensure that there are no bubbles by turning the container upside down and tapping it gently.

5.15 Filter water samples (Procedure 4.6) collected for dissolved metals analysis prior to preservation to remove the suspended sediment from the sample. If water samples are to be collected for total metals analysis, then collect a second set of samples without field filtering.

In the event that the regulatory agency(ies) want unfiltered samples for metals analysis, a second set of filtered samples should also be collected. Because unfiltered samples are indications of total metals (dissolved and suspended) they are not representative of aquifer conditions because ground water does not transport sediment (except in some rare cases). Thus, the results for dissolved metals in ground water should be based on filtered samples even if both filtered and unfiltered sets are presented in a report.

5.16 Add any necessary preservative(s) to the appropriate container(s) prior to, or after (preferred), the collection of the sample, unless the appropriate preservative(s) have already been added by the laboratory before shipment.

5.17 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance. Refer to the SOP for Collection of Quality Control Samples.

5.18 Conduct field analyses after sample collection is complete by measuring and recording the temperature, conductivity, pH, etc. (as called for in the work plan). Note and record the "final" physical appearance of the water (after purging and sampling) on an appropriate field form and in the field notebook.

5.19 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cover.

5.20 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," placed in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory.

5.21 Decontaminate bailers, hoses, and pumps as discussed in the decontamination SOP. Wrap decontaminated equipment with a suitable material (e.g., clean plastic bag or aluminum foil). Discard cords, rags, gloves, etc. in a manner consistent with site conditions.

5.22 Complete all necessary field forms, field notebook entries, and the chain-of-custody forms. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.

5.23 Samples collected from Monday through Friday will be delivered within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Consult the work plan to determine if any of the analytes require a shorter delivery time.

END OF PROCUDURE

ATTACHMENT E-2

EPA 537 (PFAS) Field Sampling Guidelines

EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampling for PFAS via EPA 537 can be challenging due to the prevalence of these compounds in consumer products. The following guidelines are strongly recommended when conducting sampling.

Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

FIELD CLOTHING and PPE

- No clothing or boots containing Gore-Tex®
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Do not use unauthorized sunscreen or insect repellant (see reference above for acceptable products)

FOOD CONSIDERATIONS

No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

OTHER RECOMMENDATIONS

Sample for PFAS first! Other containers for other methods may have PFAS present on their sampling containers

SAMPLE CONTAINERS

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene (no Teflon® -lined caps)

WET WEATHER (AS APPLICABLE)

Wet weather gear made of polyurethane and PVC only

EQUIPMENT DECONTAMINATION

- "PFAS-free" water on-site for decontamination of sample equipment. No other water sources to be used
- Only Alconox and Liquinox can be used as decontamination materials

FIELD EQUIPMENT

- Must not contain Teflon® (aka PTFE) or LDPE materials
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil must not be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFAS
- Coolers filled with regular ice only - Do not use chemical (blue) ice packs

EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampler must wash hands before wearing nitrile gloves in order to limit contamination during sampling. Each sample set requires a set of containers to comply with the method as indicated below. **Sample set is composed of samples collected from the same sample site and at the same time.*

Container Count	Container Type	Preservative
3 Sampling Containers - Empty	250 mL container	Pre preserved with 1.25 g Trizma
1 Reagent Water for Field Blank use	250 mL container	Pre preserved with 1.25 g Trizma
P1 Field Blank (FRB) - Empty	250 mL container	Unpreserved

Sampling container must be filled to the neck. For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 3 Sample containers

Field blanks are recommended and the containers have been provided, please follow the instructions below.

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container will be pre-filled with PFAS-free water and is preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.
4. If field blanks are to be analyzed, they need to be noted on COC, and will be billed accordingly as a sample.

Both the empty Reagent Water container and the filled Field Blank container must be returned to the lab along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 3 containers to be filled to the neck of the provided containers for each sampling location.
2. Before sampling, remove faucet aerator, run water for 5 min, slow water to flow of pencil to avoid splashing and fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely. Place containers in sealed ZipLoc® bags, and in a separate cooler (no other container types).
5. Ensure Chain-of-Custody and all labels on containers contain required information. Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler (do not use blue ice) and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your Alpha Analytical project manager with additional questions or concerns.

ATTACHMENT E-3

Chain of Custody Form

ROUX CHAIN OF CUSTODY

№ 11332 Y

ROUX ASSOCIATES, INC.
Environmental Consulting & Management
209 SHAFTER STREET
ISLANDIA, NEW YORK 11749-5074
(631) 232-2600 FAX: (631) 232-9898

ANALYSES

PAGE OF

PROJECT NAME | PROJECT NUMBER

PROJECT LOCATION

PROJECT MANAGER | SAMPLER(S)

SAMPLE DESIGNATION / LOCATION	DATE COLLECTED	TIME COLLECTED		SAMPLE MATRIX						TOTAL BOTTLES	NOTES

RELINQUISHED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N
RELINQUISHED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N

DELIVERY METHOD

ANALYTICAL LABORATORY

COMMENTS

CHAINOF CDR 12AUG98

APPENDIX B

Quality Assurance Project Plan

February 6, 2018

QUALITY ASSURANCE PROJECT PLAN

1221 Spofford Avenue
Tax Lot 35 of Tax Block 2738
Bronx, New York

Prepared for

THE PENINSULA JV, LLC
111 8th Avenue
New York, New York 10011

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared to describe the measures that will be taken to ensure that the data generated during performance of the Remedial Investigation Work Plan (RIWP) at the Peninsula Redevelopment Project site, located at 1221 Spofford Avenue, Bronx, New York (Site) are of quality sufficient to meet project-specific data quality objectives (DQOs).

The Peninsula Redevelopment Project (Project) consists of the demolition of the former Spofford Juvenile Detention Center and ACS Child Care Center. These facilities will be replaced with a vibrant live-work campus known as The Peninsula. The Peninsula includes the construction of a vibrant live-work campus featuring affordable housing, community space, open/recreational space, industrial space, and retail space. The entire Site encompasses an area of approximately 3.8 acres which is planned to be investigated, remediated and redeveloped under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP).

Peninsula JV, LLC is a Volunteer in the Brownfield Cleanup Program (BCP). RAWP activities will be conducted under the New York State Department of Environmental Conservation (NYSDEC) BCP. The QAPP was prepared in accordance with the guidance provided in NYSDEC Technical Guidance DER-10 (Technical Guidance for Site Investigation and Remediation), the BCP Guide and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G-4).

2.0 BACKGROUND, OBJECTIVES AND SCOPE

In order to achieve project objectives, Roux Associates has developed a scope of work that includes sampling of soil, groundwater and soil vapor. A brief overview of each element of the RI scope of work is provided below. RI sampling locations are shown in Figure 6 of the RIWP.

2.1 Soil

Samples of soil will be collected and analyzed at a minimum of 24 locations for the following analytes:

- Target Compound List (TCL) volatile organic compounds (VOCs) with a library search (VOCs+10) using United States Environmental Protection Agency (USEPA) Method 8260C/5035 High & Low;
- TCL semivolatile organic compounds (SVOCs) with a library search (SVOCs+20) using USEPA Method 8270D;
- Target Analyte List (TAL) metals (including mercury, hexavalent chromium and cyanide) using USEPA Methods 6010C, 7471B, 7196A, and 9010C/9012A; and
- TCL pesticides (USEPA Method 8081B), TCL herbicides (USEPA Method 8151A) and TCL polychlorinated biphenyls (PCBs) (USEPA Method 8082A).

2.2 Groundwater

Groundwater samples will be collected from six existing monitoring wells, twelve new permanent groundwater monitoring wells, and one temporary groundwater monitoring well, installed by Roux Associates, during the RI. After gauging with an electronic interface probe, each well will be sampled for the following analytes:

- Target Compound List (TCL) volatile organic compounds (VOCs) with a library search (VOCs+10) using United States Environmental Protection Agency (USEPA) Method 8260C;
- TCL semivolatile organic compounds (SVOCs) with a library search (SVOCs+20) using USEPA Method 8270D;
- Target Analyte List (TAL) metals (including mercury, hexavalent chromium and chromium and cyanide) using USEPA Methods 6020A; 7470A, 7196A and 9010C/9012A and
- TCL pesticides (USEPA Method 8081), TCL herbicides (USEPA Method 8151A) and TCL polychlorinated biphenyls (PCBs) (USEPA Method 8082).

Monitoring wells RXMW-2, RXMW-4 and RXMW-7 will also be analyzed for the following analytes:

- 1,4-Dioxane using USEPA Method 8270D-SIM;
- Perfluorinated Compounds (PFCs) using modified USEPA method 537 using Isotope Dilution;

Field parameters, including temperature, pH, conductivity, redox potential, dissolved oxygen, and turbidity will also be measured.

2.3 Soil Vapor Samples

Nine soil vapor samples and four sub-slab soil vapor samples will be collected during the RI to evaluate soil vapor conditions at the Site. All soil vapor samples will be collected in accordance with the October 2006 New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance) and analyzed using USEPA Method TO-15 for VOCs.

3.0 PROJECT ORGANIZATION

A general and generic summary of the overall management structure and responsibilities of project team members are presented below. Professional profiles are presented in Appendix A.

Project Principal

Frank Cherena of Roux Associates will serve as Project Principal. The Project Principal is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the investigation.

Project Manager

Jeffrey Wills of Roux Associates will serve as Project Manager. The Project Manager is responsible for defining project objectives, and bears ultimate responsibility for the successful completion of the work. This individual will provide overall management for the implementation of the scope of work and will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation.

Quality Assurance Officer (QAO)

Kathryn Sommo of Roux Associates will serve as QAO. The QAO will review sampling procedures and certify that the data was collected and analyzed using the appropriate procedures. This individual will provide coordination with the analytical laboratory and the data validator to resolve any problems.

Field Analyst

Ronald Lombino of Roux Associates will serve as the Field Analyst. The Field Analyst bears the responsibility for the successful execution of the field program. The Field Analyst will direct the activities of the technical staff in the field, as well as all subcontractors. The Field Analyst also assists in the interpretation of data and in report preparation. The Field Analyst reports to the Project Manager.

Laboratory Project Manager

The Laboratory Project Manager will be determined prior to the start of the Work. The Laboratory Project Manager is responsible for sample container preparation, sample custody in the laboratory,

and completion of the required analysis through oversight of the laboratory staff. The Laboratory Project Manager will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Field Analyst.

4.0 SAMPLING PROCEDURES

Detailed discussions of sampling, decontamination, and sample handling procedures are provided in the Field Sampling Plan (Appendix E of the RIWP).

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The primary intended use for the RI data is to characterize Site conditions and determine if remediation needs to be undertaken at the Site. The primary DQO of the soil, groundwater, and soil vapor sampling programs, therefore, is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value, and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called “field blanks”).

Table F-1 lists the field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised. Table F-2 lists the RI field and quality control sampling summary. Table F-3 lists the preservation, holding times and sample container information. Table F-4 shows the reporting limits and minimum detection limits achievable by the laboratory.

All RI “assessment” analyses (i.e., TCL VOCs, SVOCs, pesticides/hericides/PCBs, TAL metals [including hexavalent chromium] and TO-15) will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW-846 methods. The laboratory selected to analyze the field samples collected during the RI shall maintain a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Contract Laboratory Protocol (CLP) certification for each of the “assessment” analyses listed in Section 2.0.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Report will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the RI.

A QA glossary is presented in Appendix B.

TABLES

Table F-1. Field and Laboratory QC Summary

QC Check Type	Minimum Frequency	Use
Field QC		
Duplicate	1 per matrix per 20 samples or SDG*	Precision
Trip Blank	1 per VOC cooler	Sensitivity
Field Blank	1 per matrix per 20 samples	Sensitivity
Laboratory QC		
Laboratory Control Sample	1 per matrix per SDG	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate*	1 per matrix per SDG	Accuracy/Precision
Surrogate Spike	All organics samples	Accuracy
Laboratory Duplicate	1 per matrix per SDG	Precision
Method Blank	1 per matrix per SDG	Sensitivity

Notes:

* SDG - Sample Delivery Group - Assumes a single extraction or preparation

** Provided to lab by field sampling personnel

Table F-2. Remedial Investigation Field and Quality Control Sampling Summary

Sample Medium	Target Analytes	Field Samples	Replicates[1]	Trip Blanks[2]	Field Blanks[1]	Matrix Spikes[1]	Spike Duplicates[1]	Total No. of Samples
Soil	TCL VOCs +10	72	4	10	7	4	4	100
	TCL SVOCs +20	72	4	NA	7	4	4	90
	TCL Pesticides	72	4	NA	7	4	4	90
	TCL Herbicides	72	4	NA	7	4	4	90
	TCL PCBs	72	4	NA	7	4	4	90
	Hexavalent Chromium	72	4	NA	7	4	4	90
	Total Cyanide	72	4	NA	7	4	4	90
	TAL Metals, Mercury	72	4	NA	7	4	4	90
Groundwater	TCL VOCs +10	17	1	1	7	1	1	28
	TCL SVOCs +20*	17	1	NA	7	1	1	27
	Polyfluorinated Alkyl Substances (PFAs)	3	1	NA	1	1	1	7
	1-4, Dioxane	3	1	NA	1	1	1	7
	TCL Pesticides	17	1	NA	7	1	1	27
	TCL Herbicides	17	1	NA	7	1	1	27
	TCL PCBs	17	1	NA	7	1	1	27
	Hexavalent Chromium	17	1	NA	7	1	1	27
	Total Cyanide	17	1	NA	7	1	1	27
	TAL Metals*, Mercury	17	1	NA	7	1	1	27
Soil Vapor	TO-15 VOCs	14	0	NA	0	0	0	14

Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.

[1] Based on 1 per 20 samples or 1 per Sample Delivery Group (3 days max)

[2] Based on 1 cooler per day

TCL - USEPA Contract Laboratory Program Target Compound List

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds

PCBs - Polychlorinated Biphenyls

TAL - USEPA Contract Laboratory Program Target Analyte List

NA - Not Applicable

*All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs.

Table F-3. Preservation, Holding Times and Sample Containers

Analysis	Method	Matrix	Bottle Type	Preservation(s)	Holding Time(b)
Volatile Organic Compounds (VOCs) in Ambient Ai	EPA TO-15	Air	6 liter Summa Canister	Cool to 4°C	30 days from sample collection
TAL Metals (total), Mercury	EPA 6010C/7471B EPA 6020A/7470A	Soil Water	8 oz wide mouth glass, teflon lined cap 250 mL plastic, teflon lined cap	Cool to 4°C Nitric acid (HNO3) to a ph<2	180 days, Hg 28 days
Polyfluorinated Alkyl Substances (PFAs)	EPA 537(M)-Isotope Dilution (WATER)	Water	3 - 250 mL plastic	Cool to 4°C Trizma	14 days from sample collection
1-4, Dioxane	EPA 8270SIM	Water	500 mL amber glass jar		7 days from sample collection
Hexavalent Chromium	EPA 7196A EPA 7196A	Soil Water	1 - Glass 120ml/4oz 1 - Plastic 500ml	Cool to 4°C	30 days 24 hours
Total Cyanide	EPA 9010C/9012A EPA 9010C/9012A	Soil Water	1 - Glass 250ml/8oz 1 - Plastic 250ml	Cool to 4°C Sodium hydroxide (NaOH)	14 days from sample collection 14 days from sample collection
Target Compound List (TCL)					
TCL Volatile Organic Compounds (VOCs)	EPA 8260C/5035 High&Low EPA 8260C	Soil Water	1 - 1 Vial MeOH/2 Vial Water (via Encore 40mL 3 voa vial, teflon lined cap	Cool to 4°C Hydrochloric Acid to a ph<2	14 days from sample collection
TCL Semivolatile Organic Compounds (SVOCs)	EPA 8270D EPA 8270D	Soil Water	8 oz wide mouth glass, teflon lined cap 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis 7 days to extract, 40 days to analysis
TCL Pesticides	EPA 8081B EPA 8081B	Soil Water	8 oz wide mouth glass, teflon lined cap 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis 7 days to extract, 40 days to analysis
TCL Herbicides	EPA 8151A EPA 8151A	Soil Water	8 oz wide mouth glass, teflon lined cap 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis 7 days to extract, 40 days to analysis
TCL Polychlorinated biphenyls (PCBs)	EPA 8082A EPA 8082A	Soil Water	8 oz wide mouth glass, teflon lined cap 1 liter amber glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis 7 days to extract, 40 days to analysis

[a] All soil and groundwater samples to be preserved in ice during collection and transport

[b] Days from date of sample collection.

TAL - Target Analyte List

TCL - USEPA Contract Laboratory Program Target Compound List

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Roux Associates, Inc.
TCL-SOIL
METALS by 6010C (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	4	1.08	mg/kg	48-151		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Antimony, Total	7440-36-0	2	0.152	mg/kg	1-208		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Arsenic, Total	7440-38-2	0.4	0.0832	mg/kg	79-121		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Barium, Total	7440-39-3	0.4	0.0696	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Beryllium, Total	7440-41-7	0.2	0.0132	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cadmium, Total	7440-43-9	0.4	0.0392	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Calcium, Total	7440-70-2	4	1.4	mg/kg	81-119		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Chromium, Total	7440-47-3	0.4	0.0384	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cobalt, Total	7440-48-4	0.8	0.0664	mg/kg	84-115		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Copper, Total	7440-50-8	0.4	0.1032	mg/kg	81-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Iron, Total	7439-89-6	2	0.3612	mg/kg	45-155		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Lead, Total	7439-92-1	2	0.1072	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Magnesium, Total	7439-95-4	4	0.616	mg/kg	76-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Manganese, Total	7439-96-5	0.4	0.0636	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Nickel, Total	7440-02-0	1	0.0968	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Potassium, Total	7440-09-7	100	5.76	mg/kg	71-129		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Selenium, Total	7782-49-2	0.8	0.1032	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Silver, Total	7440-22-4	0.4	0.1132	mg/kg	75-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Sodium, Total	7440-23-5	80	1.26	mg/kg	72-127		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Thallium, Total	7440-28-0	0.8	0.126	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Vanadium, Total	7440-62-2	0.4	0.0812	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Zinc, Total	7440-66-6	2	0.1172	mg/kg	82-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved

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Roux Associates, Inc.
TCL-SOIL
METALS by 7471B (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.08	0.016896	mg/kg	72-128		80-120	20	20		28 days	Metals Only-Glass 60mL/2oz unpreserved

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Roux Associates, Inc.
TCL-SOIL
TCL Pesticides - EPA 8081B (SOIL)

Holding Time: 14 days
Container / Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	7.9992	1.56651	ug/kg	30-150	30	30-150	50	50			
Lindane	58-89-9	3.333	1.489851	ug/kg	30-150	30	30-150	50	50			
Alpha-BHC	319-84-6	3.333	0.946572	ug/kg	30-150	30	30-150	50	50			
Beta-BHC	319-85-7	7.9992	3.03303	ug/kg	30-150	30	30-150	50	50			
Heptachlor	76-44-8	3.9996	1.793154	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	7.9992	2.816385	ug/kg	30-150	30	30-150	50	50			
Heptachlor epoxide	1024-57-3	14.9985	4.49955	ug/kg	30-150	30	30-150	50	50			
Endrin	72-20-8	3.333	1.36653	ug/kg	30-150	30	30-150	50	50			
Endrin aldehyde	7421-93-4	9.999	3.49965	ug/kg	30-150	30	30-150	50	50			
Endrin ketone	53494-70-5	7.9992	2.059794	ug/kg	30-150	30	30-150	50	50			
Dieldrin	60-57-1	4.9995	2.49975	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	7.9992	1.849815	ug/kg	30-150	30	30-150	50	50			
4,4'-DDD	72-54-8	7.9992	2.853048	ug/kg	30-150	30	30-150	50	50			
4,4'-DDT	50-29-3	14.9985	6.43269	ug/kg	30-150	30	30-150	50	50			
Endosulfan I	959-98-8	7.9992	1.889811	ug/kg	30-150	30	30-150	50	50			
Endosulfan II	33213-65-9	7.9992	2.673066	ug/kg	30-150	30	30-150	50	50			
Endosulfan sulfate	1031-07-8	3.333	1.523181	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	14.9985	4.6662	ug/kg	30-150	30	30-150	50	50			
Toxaphene	8001-35-2	149.985	41.9958	ug/kg	30-150	30	30-150	50	50			
cis-Chlordane	5103-71-9	9.999	2.786388	ug/kg	30-150	30	30-150	50	50			
trans-Chlordane	5103-74-2	9.999	2.639736	ug/kg	30-150	30	30-150	50	50			
Chlordane	57-74-9	64.9935	26.49735	ug/kg	30-150	30	30-150	50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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Roux Associates, Inc.
TCL-SOIL
TCL Volatiles - EPA 8260C/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	10	1.65	ug/kg	70-130	30	70-130	30	30			
1,1-Dichloroethane	75-34-3	1.5	0.27	ug/kg	70-130	30	70-130	30	30			
Chloroform	67-66-3	1.5	0.37	ug/kg	70-130	30	70-130	30	30			
Carbon tetrachloride	56-23-5	1	0.345	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloropropane	78-87-5	3.5	0.228	ug/kg	70-130	30	70-130	30	30			
Dibromochloromethane	124-48-1	1	0.176	ug/kg	70-130	30	70-130	30	30			
1,1,2-Trichloroethane	79-00-5	1.5	0.313	ug/kg	70-130	30	70-130	30	30			
Tetrachloroethene	127-18-4	1	0.302	ug/kg	70-130	30	70-130	30	30			
Chlorobenzene	108-90-7	1	0.348	ug/kg	70-130	30	70-130	30	30			
Trichlorofluoromethane	75-69-4	5	0.417	ug/kg	70-139	30	70-139	30	30			
1,2-Dichloroethane	107-06-2	1	0.246	ug/kg	70-130	30	70-130	30	30			
1,1,1-Trichloroethane	71-55-6	1	0.35	ug/kg	70-130	30	70-130	30	30			
Bromodichloromethane	75-27-4	1	0.308	ug/kg	70-130	30	70-130	30	30			
trans-1,3-Dichloropropene	10061-02-6	1	0.208	ug/kg	70-130	30	70-130	30	30			
cis-1,3-Dichloropropene	10061-01-5	1	0.231	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropene, Total	542-75-6	1	0.208	ug/kg				30	30			
1,3-Dichloropropene, Total	542-75-6	1	0.208	ug/kg				30	30			
1,1-Dichloropropene	563-58-6	5	0.328	ug/kg	70-130	30	70-130	30	30			
Bromoform	75-25-2	4	0.237	ug/kg	70-130	30	70-130	30	30			
1,1,2,2-Tetrachloroethane	79-34-5	1	0.298	ug/kg	70-130	30	70-130	30	30			
Benzene	71-43-2	1	0.193	ug/kg	70-130	30	70-130	30	30			
Toluene	108-88-3	1.5	0.195	ug/kg	70-130	30	70-130	30	30			
Ethylbenzene	100-41-4	1	0.17	ug/kg	70-130	30	70-130	30	30			
Chloromethane	74-87-3	5	0.436	ug/kg	52-130	30	52-130	30	30			
Bromomethane	74-83-9	2	0.338	ug/kg	57-147	30	57-147	30	30			
Vinyl chloride	75-01-4	2	0.315	ug/kg	67-130	30	67-130	30	30			
Chloroethane	75-00-3	2	0.316	ug/kg	50-151	30	50-151	30	30			
1,1-Dichloroethene	75-35-4	1	0.372	ug/kg	65-135	30	65-135	30	30			
trans-1,2-Dichloroethene	156-60-5	1.5	0.241	ug/kg	70-130	30	70-130	30	30			
Trichloroethene	79-01-6	1	0.302	ug/kg	70-130	30	70-130	30	30			
1,2-Dichlorobenzene	95-50-1	5	0.182	ug/kg	70-130	30	70-130	30	30			
1,3-Dichlorobenzene	541-73-1	5	0.218	ug/kg	70-130	30	70-130	30	30			
1,4-Dichlorobenzene	106-46-7	5	0.182	ug/kg	70-130	30	70-130	30	30			
Methyl tert butyl ether	1634-04-4	2	0.153	ug/kg	66-130	30	66-130	30	30			
p/m-Xylene	179601-23-1	2	0.351	ug/kg	70-130	30	70-130	30	30			
o-Xylene	95-47-6	2	0.338	ug/kg	70-130	30	70-130	30	30			
Xylene (Total)	1330-20-7	2	0.338	ug/kg				30	30			
Xylene (Total)	1330-20-7	2	0.338	ug/kg				30	30			
cis-1,2-Dichloroethene	156-59-2	1	0.342	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethene (total)	540-59-0	1	0.241	ug/kg				30	30			
1,2-Dichloroethene (total)	540-59-0	1	0.241	ug/kg				30	30			
Dibromomethane	74-95-3	10	0.239	ug/kg	70-130	30	70-130	30	30			

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Roux Associates, Inc.
TCL-SOIL
TCL Volatiles - EPA 8260C/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Styrene	100-42-5	2	0.401	ug/kg	70-130	30	70-130	30	30			
Dichlorodifluoromethane	75-71-8	10	0.5	ug/kg	30-146	30	30-146	30	30			
Acetone	67-64-1	10	2.29	ug/kg	54-140	30	54-140	30	30			
Carbon disulfide	75-15-0	10	1.1	ug/kg	59-130	30	59-130	30	30			
2-Butanone	78-93-3	10	0.69	ug/kg	70-130	30	70-130	30	30			
Vinyl acetate	108-05-4	10	0.153	ug/kg	70-130	30	70-130	30	30			
4-Methyl-2-pentanone	108-10-1	10	0.244	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichloropropane	96-18-4	10	0.177	ug/kg	68-130	30	68-130	30	30			
2-Hexanone	591-78-6	10	0.666	ug/kg	70-130	30	70-130	30	30			
Bromochloromethane	74-97-5	5	0.357	ug/kg	70-130	30	70-130	30	30			
2,2-Dichloropropane	594-20-7	5	0.45	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromoethane	106-93-4	4	0.199	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropane	142-28-9	5	0.183	ug/kg	69-130	30	69-130	30	30			
1,1,1,2-Tetrachloroethane	630-20-6	1	0.318	ug/kg	70-130	30	70-130	30	30			
Bromobenzene	108-86-1	5	0.219	ug/kg	70-130	30	70-130	30	30			
n-Butylbenzene	104-51-8	1	0.228	ug/kg	70-130	30	70-130	30	30			
sec-Butylbenzene	135-98-8	1	0.217	ug/kg	70-130	30	70-130	30	30			
tert-Butylbenzene	98-06-6	5	0.247	ug/kg	70-130	30	70-130	30	30			
o-Chlorotoluene	95-49-8	5	0.221	ug/kg	70-130	30	70-130	30	30			
p-Chlorotoluene	106-43-4	5	0.183	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromo-3-chloropropane	96-12-8	5	0.396	ug/kg	68-130	30	68-130	30	30			
Hexachlorobutadiene	87-68-3	5	0.348	ug/kg	67-130	30	67-130	30	30			
Isopropylbenzene	98-82-8	1	0.194	ug/kg	70-130	30	70-130	30	30			
p-Isopropyltoluene	99-87-6	1	0.202	ug/kg	70-130	30	70-130	30	30			
Naphthalene	91-20-3	5	0.138	ug/kg	70-130	30	70-130	30	30			
Acrylonitrile	107-13-1	10	0.514	ug/kg	70-130	30	70-130	30	30			
n-Propylbenzene	103-65-1	1	0.215	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichlorobenzene	87-61-6	5	0.251	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trichlorobenzene	120-82-1	5	0.215	ug/kg	70-130	30	70-130	30	30			
1,3,5-Trimethylbenzene	108-67-8	5	0.161	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trimethylbenzene	95-63-6	5	0.186	ug/kg	70-130	30	70-130	30	30			
1,4-Dioxane	123-91-1	40	14.4	ug/kg	65-136	30	65-136	30	30			
1,4-Diethylbenzene	105-05-5	4	4	ug/kg	70-130	30	70-130	30	30			
4-Ethyltoluene	622-96-8	4	0.234	ug/kg	70-130	30	70-130	30	30			
1,2,4,5-Tetramethylbenzene	95-93-2	4	0.156	ug/kg	70-130	30	70-130	30	30			
Ethyl ether	60-29-7	5	0.26	ug/kg	67-130	30	67-130	30	30			
trans-1,4-Dichloro-2-butene	110-57-6	5	0.392	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
2-Chloroethoxyethane												
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

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Roux Associates, Inc.
TCL-SOIL
NYTCL Semivolatiles - EPA 8270D (SOIL)

Holding Time: 14 days
Container / Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	0.1332	0.0172494	mg/kg	31-137	50	31-137	50	50			
1,2,4-Trichlorobenzene	120-82-1	0.1665	0.0190476	mg/kg	38-107	50	38-107	50	50			
Hexachlorobenzene	118-74-1	0.0999	0.018648	mg/kg	40-140	50	40-140	50	50			
Bis(2-chloroethyl)ether	111-44-4	0.14985	0.0225774	mg/kg	40-140	50	40-140	50	50			
2-Chloronaphthalene	91-58-7	0.1665	0.0165168	mg/kg	40-140	50	40-140	50	50			
1,2-Dichlorobenzene	95-50-1	0.1665	0.0299034	mg/kg	40-140	50	40-140	50	50			
1,3-Dichlorobenzene	541-73-1	0.1665	0.028638	mg/kg	40-140	50	40-140	50	50			
1,4-Dichlorobenzene	106-46-7	0.1665	0.0290709	mg/kg	28-104	50	28-104	50	50			
3,3'-Dichlorobenzidine	91-94-1	0.1665	0.044289	mg/kg	40-140	50	40-140	50	50			
2,4-Dinitrotoluene	121-14-2	0.1665	0.0333	mg/kg	28-89	50	28-89	50	50			
2,6-Dinitrotoluene	606-20-2	0.1665	0.0285714	mg/kg	40-140	50	40-140	50	50			
Fluoranthene	206-44-0	0.0999	0.0191142	mg/kg	40-140	50	40-140	50	50			
4-Chlorophenyl phenyl ether	7005-72-3	0.1665	0.0178155	mg/kg	40-140	50	40-140	50	50			
4-Bromophenyl phenyl ether	101-55-3	0.1665	0.0254079	mg/kg	40-140	50	40-140	50	50			
Bis(2-chloroisopropyl)ether	108-60-1	0.1998	0.0284382	mg/kg	40-140	50	40-140	50	50			
Bis(2-chloroethoxy)methane	111-91-1	0.17982	0.0166833	mg/kg	40-117	50	40-117	50	50			
Hexachlorobutadiene	87-68-3	0.1665	0.0243756	mg/kg	40-140	50	40-140	50	50			
Hexachlorocyclopentadiene	77-47-4	0.47619	0.150849	mg/kg	40-140	50	40-140	50	50			
Hexachloroethane	67-72-1	0.1332	0.0269397	mg/kg	40-140	50	40-140	50	50			
Isophorone	78-59-1	0.14985	0.0216117	mg/kg	40-140	50	40-140	50	50			
Naphthalene	91-20-3	0.1665	0.0202797	mg/kg	40-140	50	40-140	50	50			
Nitrobenzene	98-95-3	0.14985	0.024642	mg/kg	40-140	50	40-140	50	50			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	0.1332	0.0189477	mg/kg	36-157	50	36-157	50	50			
n-Nitrosodi-n-propylamine	621-64-7	0.1665	0.0257076	mg/kg	32-121	50	32-121	50	50			
Bis(2-Ethylhexyl)phthalate	117-81-7	0.1665	0.057609	mg/kg	40-140	50	40-140	50	50			
Butyl benzyl phthalate	85-68-7	0.1665	0.041958	mg/kg	40-140	50	40-140	50	50			
Di-n-butylphthalate	84-74-2	0.1665	0.0315684	mg/kg	40-140	50	40-140	50	50			
Di-n-octylphthalate	117-84-0	0.1665	0.05661	mg/kg	40-140	50	40-140	50	50			
Diethyl phthalate	84-66-2	0.1665	0.0154179	mg/kg	40-140	50	40-140	50	50			
Dimethyl phthalate	131-11-3	0.1665	0.034965	mg/kg	40-140	50	40-140	50	50			
Benzo(a)anthracene	56-55-3	0.0999	0.0187479	mg/kg	40-140	50	40-140	50	50			
Benzo(a)pyrene	50-32-8	0.1332	0.040626	mg/kg	40-140	50	40-140	50	50			
Benzo(b)fluoranthene	205-99-2	0.0999	0.0280386	mg/kg	40-140	50	40-140	50	50			
Benzo(k)fluoranthene	207-08-9	0.0999	0.02664	mg/kg	40-140	50	40-140	50	50			
Chrysene	218-01-9	0.0999	0.017316	mg/kg	40-140	50	40-140	50	50			
Acenaphthylene	208-96-8	0.1332	0.0257076	mg/kg	40-140	50	40-140	50	50			
Anthracene	120-12-7	0.0999	0.0324675	mg/kg	40-140	50	40-140	50	50			
Benzo(ghi)perylene	191-24-2	0.1332	0.0195804	mg/kg	40-140	50	40-140	50	50			
Fluorene	86-73-7	0.1665	0.0161838	mg/kg	40-140	50	40-140	50	50			
Phenanthrene	85-01-8	0.0999	0.0202464	mg/kg	40-140	50	40-140	50	50			
Dibenzo(a,h)anthracene	53-70-3	0.0999	0.0192474	mg/kg	40-140	50	40-140	50	50			
Indeno(1,2,3-cd)Pyrene	193-39-5	0.1332	0.0232101	mg/kg	40-140	50	40-140	50	50			

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Roux Associates, Inc.
TCL-SOIL
NYTCL Semivolatiles - EPA 8270D (SOIL)

Holding Time: 14 days
Container / Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	0.0999	0.0165501	mg/kg	35-142	50	35-142	50	50			
Biphenyl	92-52-4	0.37962	0.038628	mg/kg	54-104	50	54-104	50	50			
4-Chloroaniline	106-47-8	0.1665	0.030303	mg/kg	40-140	50	40-140	50	50			
2-Nitroaniline	88-74-4	0.1665	0.0321012	mg/kg	47-134	50	47-134	50	50			
3-Nitroaniline	99-09-2	0.1665	0.0314019	mg/kg	26-129	50	26-129	50	50			
4-Nitroaniline	100-01-6	0.1665	0.068931	mg/kg	41-125	50	41-125	50	50			
Dibenzofuran	132-64-9	0.1665	0.0157509	mg/kg	40-140	50	40-140	50	50			
2-Methylnaphthalene	91-57-6	0.1998	0.0201132	mg/kg	40-140	50	40-140	50	50			
1,2,4,5-Tetrachlorobenzene	95-94-3	0.1665	0.0173826	mg/kg	40-117	50	40-117	50	50			
Acetophenone	98-86-2	0.1665	0.0206127	mg/kg	14-144	50	14-144	50	50			
2,4,6-Trichlorophenol	88-06-2	0.0999	0.0315684	mg/kg	30-130	50	30-130	50	50			
P-Chloro-M-Cresol	59-50-7	0.1665	0.0248085	mg/kg	26-103	50	26-103	50	50			
2-Chlorophenol	95-57-8	0.1665	0.0196803	mg/kg	25-102	50	25-102	50	50			
2,4-Dichlorophenol	120-83-2	0.14985	0.0267732	mg/kg	30-130	50	30-130	50	50			
2,4-Dimethylphenol	105-67-9	0.1665	0.054945	mg/kg	30-130	50	30-130	50	50			
2-Nitrophenol	88-75-5	0.35964	0.062604	mg/kg	30-130	50	30-130	50	50			
4-Nitrophenol	100-02-7	0.2331	0.067932	mg/kg	11-114	50	11-114	50	50			
2,4-Dinitrophenol	51-28-5	0.7992	0.077589	mg/kg	4-130	50	4-130	50	50			
4,6-Dinitro-o-cresol	534-52-1	0.4329	0.07992	mg/kg	10-130	50	10-130	50	50			
Pentachlorophenol	87-86-5	0.1332	0.03663	mg/kg	17-109	50	17-109	50	50			
Phenol	108-95-2	0.1665	0.0251415	mg/kg	26-90	50	26-90	50	50			
2-Methylphenol	95-48-7	0.1665	0.0258075	mg/kg	30-130.	50	30-130.	50	50			
3-Methylphenol/4-Methylphenol	106-44-5	0.23976	0.0260739	mg/kg	30-130	50	30-130	50	50			
2,4,5-Trichlorophenol	95-95-4	0.1665	0.0319014	mg/kg	30-130	50	30-130	50	50			
Benzoic Acid	65-85-0	0.53946	0.168498	mg/kg	10-110	50	10-110	50	50			
Benzyl Alcohol	100-51-6	0.1665	0.050949	mg/kg	40-140	50	40-140	50	50			
Carbazole	86-74-8	0.1665	0.0161838	mg/kg	54-128	50	54-128	50	50			
2-Fluorophenol	*367-12-4*									*25-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*30-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-136*		
4-Terphenyl-d14	*1718-51-0*									*18-120*		

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Roux Associates, Inc.
TCL-SOIL
Herbicides -EPA 8151A (SOIL)

Holding Time: 14 days
Container / Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2,4-D	94-75-7	166.5	10.4895	ug/kg	30-150	30	30-150	30	30			
2,4,5-T	93-76-5	166.5	5.1615	ug/kg	30-150	30	30-150	30	30			
2,4,5-TP (Silvex)	93-72-1	166.5	4.4289	ug/kg	30-150	30	30-150	30	30			
DCAA	*19719-28-9*									*30-150*		

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Roux Associates, Inc.
TCL-SOIL
TCL PCBs - EPA 8082A (SOIL)

Holding Time: 14 days
Container / Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	33.5	2.6465	ug/kg	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	33.5	3.0887	ug/kg	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	33.5	3.9262	ug/kg	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	33.5	4.1004	ug/kg	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	33.5	2.8274	ug/kg	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	33.5	2.7537	ug/kg	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	33.5	2.5527	ug/kg	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	33.5	1.6616	ug/kg	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	33.5	4.8575	ug/kg	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	33.5	1.6616	ug/kg				50	50			
PCBs, Total	1336-36-3	33.5	1.6616	ug/kg				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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Roux Associates, Inc.
TCL-SOIL
WETCHEM (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container
Cyanide, Total	57-12-5	1	0.166	mg/kg	80-120	35	75-125	35	35	9010C/9012A	14 days	1 - Glass 250ml/8oz unpreserved
Chromium, Hexavalent	18540-29-9	0.8	0.16	mg/kg	80-120	20	75-125	20	20	7196A	30 days	1 - Glass 120ml/4oz unpreserved

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Roux Associates, Inc.
NYTCL-WATER
TCL Volatiles - EPA 8260C (WATER)

Holding Time: 14 days
Container / Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1-Dichloroethane	75-34-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloroform	67-66-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Carbon tetrachloride	56-23-5	0.5	0.134	ug/l	63-132	20	63-132	20	20			
1,2-Dichloropropane	78-87-5	1	0.133	ug/l	70-130	20	70-130	20	20			
Dibromochloromethane	124-48-1	0.5	0.149	ug/l	63-130	20	63-130	20	20			
1,1,2-Trichloroethane	79-00-5	1.5	0.5	ug/l	70-130	20	70-130	20	20			
Tetrachloroethene	127-18-4	0.5	0.181	ug/l	70-130	20	70-130	20	20			
Chlorobenzene	108-90-7	2.5	0.7	ug/l	75-130	20	75-130	20	20			
Trichlorofluoromethane	75-69-4	2.5	0.7	ug/l	62-150	20	62-150	20	20			
1,2-Dichloroethane	107-06-2	0.5	0.132	ug/l	70-130	20	70-130	20	20			
1,1,1-Trichloroethane	71-55-6	2.5	0.7	ug/l	67-130	20	67-130	20	20			
Bromodichloromethane	75-27-4	0.5	0.192	ug/l	67-130	20	67-130	20	20			
trans-1,3-Dichloropropene	10061-02-6	0.5	0.164	ug/l	70-130	20	70-130	20	20			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.144	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropene, Total	542-75-6	0.5	0.144	ug/l				20	20			
1,3-Dichloropropene, Total	542-75-6	0.5	0.144	ug/l				20	20			
1,1-Dichloropropene	563-58-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Bromoform	75-25-2	2	0.65	ug/l	54-136	20	54-136	20	20			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.144	ug/l	67-130	20	67-130	20	20			
Benzene	71-43-2	0.5	0.159	ug/l	70-130	20	70-130	20	20			
Toluene	108-88-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Ethylbenzene	100-41-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloromethane	74-87-3	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromomethane	74-83-9	2.5	0.7	ug/l	39-139	20	39-139	20	20			
Vinyl chloride	75-01-4	1	0.0699	ug/l	55-140	20	55-140	20	20			
Chloroethane	75-00-3	2.5	0.7	ug/l	55-138	20	55-138	20	20			
1,1-Dichloroethene	75-35-4	0.5	0.142	ug/l	61-145	20	61-145	20	20			
trans-1,2-Dichloroethene	156-60-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Trichloroethene	79-01-6	0.5	0.175	ug/l	70-130	20	70-130	20	20			
1,2-Dichlorobenzene	95-50-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3-Dichlorobenzene	541-73-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dichlorobenzene	106-46-7	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Methyl tert butyl ether	1634-04-4	2.5	0.7	ug/l	63-130	20	63-130	20	20			
p/m-Xylene	179601-23-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Xylene	95-47-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Xylene (Total)	1330-20-7	2.5	0.7	ug/l				20	20			
Xylene (Total)	1330-20-7	2.5	0.7	ug/l				20	20			
cis-1,2-Dichloroethene	156-59-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethene (total)	540-59-0	2.5	0.7	ug/l				20	20			
1,2-Dichloroethene (total)	540-59-0	2.5	0.7	ug/l				20	20			
Dibromomethane	74-95-3	5	1	ug/l	70-130	20	70-130	20	20			

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Roux Associates, Inc.
NYTCL-WATER
TCL Volatiles - EPA 8260C (WATER)

Holding Time: 14 days
Container / Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,2,3-Trichloropropane	96-18-4	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Acrylonitrile	107-13-1	5	1.5	ug/l	70-130	20	70-130	20	20			
Styrene	100-42-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Dichlorodifluoromethane	75-71-8	5	1	ug/l	36-147	20	36-147	20	20			
Acetone	67-64-1	5	1.46	ug/l	58-148	20	58-148	20	20			
Carbon disulfide	75-15-0	5	1	ug/l	51-130	20	51-130	20	20			
2-Butanone	78-93-3	5	1.94	ug/l	63-138	20	63-138	20	20			
Vinyl acetate	108-05-4	5	1	ug/l	70-130	20	70-130	20	20			
4-Methyl-2-pentanone	108-10-1	5	1	ug/l	59-130	20	59-130	20	20			
2-Hexanone	591-78-6	5	1	ug/l	57-130	20	57-130	20	20			
Bromochloromethane	74-97-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
2,2-Dichloropropane	594-20-7	2.5	0.7	ug/l	63-133	20	63-133	20	20			
1,2-Dibromoethane	106-93-4	2	0.65	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropane	142-28-9	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1,1,2-Tetrachloroethane	630-20-6	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromobenzene	108-86-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
n-Butylbenzene	104-51-8	2.5	0.7	ug/l	53-136	20	53-136	20	20			
sec-Butylbenzene	135-98-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
tert-Butylbenzene	98-06-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Chlorotoluene	95-49-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
p-Chlorotoluene	106-43-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dibromo-3-chloropropane	96-12-8	2.5	0.7	ug/l	41-144	20	41-144	20	20			
Hexachlorobutadiene	87-68-3	2.5	0.7	ug/l	63-130	20	63-130	20	20			
Isopropylbenzene	98-82-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
p-Isopropyltoluene	99-87-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Naphthalene	91-20-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
n-Propylbenzene	103-65-1	2.5	0.7	ug/l	69-130	20	69-130	20	20			
1,2,3-Trichlorobenzene	87-61-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2,4-Trichlorobenzene	120-82-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3,5-Trimethylbenzene	108-67-8	2.5	0.7	ug/l	64-130	20	64-130	20	20			
1,2,4-Trimethylbenzene	95-63-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dioxane	123-91-1	250	41.1	ug/l	56-162	20	56-162	20	20			
1,4-Diethylbenzene	105-05-5	2	0.7	ug/l	70-130	20	70-130	20	20			
4-Ethyltoluene	622-96-8	2	0.7	ug/l	70-130	20	70-130	20	20			
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.65	ug/l	70-130	20	70-130	20	20			
Ethyl ether	60-29-7	2.5	0.7	ug/l	59-134	20	59-134	20	20			
trans-1,4-Dichloro-2-butene	110-57-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

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Roux Associates, Inc.
NYTCL-WATER
METALS by 6020A (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	0.01	0.00327	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Antimony, Total	7440-36-0	0.004	0.000429	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Arsenic, Total	7440-38-2	0.0005	0.000165	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Barium, Total	7440-39-3	0.0005	0.000173	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Beryllium, Total	7440-41-7	0.0005	0.000107	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cadmium, Total	7440-43-9	0.0002	0.0000599	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Calcium, Total	7440-70-2	0.1	0.0394	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Chromium, Total	7440-47-3	0.001	0.000178	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cobalt, Total	7440-48-4	0.0005	0.000163	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Copper, Total	7440-50-8	0.001	0.000384	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Iron, Total	7439-89-6	0.05	0.0191	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Lead, Total	7439-92-1	0.001	0.000343	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Magnesium, Total	7439-95-4	0.07	0.0242	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Manganese, Total	7439-96-5	0.001	0.00044	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Nickel, Total	7440-02-0	0.002	0.000556	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Potassium, Total	7440-09-7	0.1	0.0309	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Selenium, Total	7782-49-2	0.005	0.00173	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Silver, Total	7440-22-4	0.0004	0.000163	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Sodium, Total	7440-23-5	0.1	0.0293	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Thallium, Total	7440-28-0	0.0005	0.000143	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Vanadium, Total	7440-62-2	0.005	0.00157	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Zinc, Total	7440-66-6	0.01	0.00341	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved

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Roux Associates, Inc.
NYTCL-WATER
METALS by 7470A (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.0002	0.000066	mg/l	80-120		75-125	20	20		28 days	1 - Plastic 500ml HNO3 preserved

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Roux Associates, Inc.
NYTCL-WATER
Herbicides -EPA 8151A (WATER)

Holding Time: 7 days
Container / Sample Preservation: 2 - Amber 1000ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2,4-D	94-75-7	10	0.498	ug/l	30-150	25	30-150	25	25			
2,4,5-T	93-76-5	2	0.531	ug/l	30-150	25	30-150	25	25			
2,4,5-TP (Silvex)	93-72-1	2	0.539	ug/l	30-150	25	30-150	25	25			
DCAA	*19719-28-9*									*30-150*		

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Roux Associates, Inc.
NYTCL-WATER
TCL Pesticides - EPA 8081B (WATER)

Holding Time: 7 days
Container / Sample Preservation: 2 - Amber 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	0.02	0.00467	ug/l	30-150	20	30-150	30	30			
Lindane	58-89-9	0.02	0.00434	ug/l	30-150	20	30-150	30	30			
Alpha-BHC	319-84-6	0.02	0.00439	ug/l	30-150	20	30-150	30	30			
Beta-BHC	319-85-7	0.02	0.0056	ug/l	30-150	20	30-150	30	30			
Heptachlor	76-44-8	0.02	0.0031	ug/l	30-150	20	30-150	30	30			
Aldrin	309-00-2	0.02	0.00216	ug/l	30-150	20	30-150	30	30			
Heptachlor epoxide	1024-57-3	0.02	0.00415	ug/l	30-150	20	30-150	30	30			
Endrin	72-20-8	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
Endrin aldehyde	7421-93-4	0.04	0.0081	ug/l	30-150	20	30-150	30	30			
Endrin ketone	53494-70-5	0.04	0.00477	ug/l	30-150	20	30-150	30	30			
Dieldrin	60-57-1	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
4,4'-DDE	72-55-9	0.04	0.00381	ug/l	30-150	20	30-150	30	30			
4,4'-DDD	72-54-8	0.04	0.00464	ug/l	30-150	20	30-150	30	30			
4,4'-DDT	50-29-3	0.04	0.00432	ug/l	30-150	20	30-150	30	30			
Endosulfan I	959-98-8	0.02	0.00345	ug/l	30-150	20	30-150	30	30			
Endosulfan II	33213-65-9	0.04	0.00519	ug/l	30-150	20	30-150	30	30			
Endosulfan sulfate	1031-07-8	0.04	0.00481	ug/l	30-150	20	30-150	30	30			
Methoxychlor	72-43-5	0.2	0.00684	ug/l	30-150	20	30-150	30	30			
Toxaphene	8001-35-2	0.2	0.0627	ug/l	30-150	20	30-150	30	30			
cis-Chlordane	5103-71-9	0.02	0.00666	ug/l	30-150	20	30-150	30	30			
trans-Chlordane	5103-74-2	0.02	0.00627	ug/l	30-150	20	30-150	30	30			
Chlordane	57-74-9	0.2	0.0463	ug/l	30-150	20	30-150	30	30			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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Roux Associates, Inc.
NYTCL-WATER
TCL PCBs - EPA 8082A (WATER)

Holding Time: 7 days
Container / Sample Preservation: 2 - Amber 1000ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	0.083	0.05478	ug/l	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	0.083	0.05312	ug/l	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	0.083	0.03071	ug/l	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	0.083	0.05976	ug/l	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	0.083	0.05063	ug/l	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	0.083	0.03403	ug/l	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	0.083	0.03154	ug/l	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	0.083	0.02905	ug/l	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	0.083	0.03735	ug/l	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	0.083	0.02905	ug/l				50	50			
PCBs, Total	1336-36-3	0.083	0.02905	ug/l				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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Roux Associates, Inc.
NYTCL-WATER
NYTCL Semivolatiles - EPA 8270D (WATER)

Holding Time: 7 days
Container / Sample Preservation: 2 - Amber 1000ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,2,4-Trichlorobenzene	120-82-1	5	0.661	ug/l	39-98	30	39-98	30	30			
Bis(2-chloroethyl)ether	111-44-4	2	0.669	ug/l	40-140	30	40-140	30	30			
1,2-Dichlorobenzene	95-50-1	2	0.732	ug/l	40-140	30	40-140	30	30			
1,3-Dichlorobenzene	541-73-1	2	0.732	ug/l	40-140	30	40-140	30	30			
1,4-Dichlorobenzene	106-46-7	2	0.708	ug/l	36-97	30	36-97	30	30			
3,3'-Dichlorobenzidine	91-94-1	5	1.39	ug/l	40-140	30	40-140	30	30			
2,4-Dinitrotoluene	121-14-2	5	0.845	ug/l	24-96	30	24-96	30	30			
2,6-Dinitrotoluene	606-20-2	5	1.12	ug/l	40-140	30	40-140	30	30			
Fluoranthene	206-44-0	2	0.568	ug/l	40-140	30	40-140	30	30			
4-Chlorophenyl phenyl ether	7005-72-3	2	0.625	ug/l	40-140	30	40-140	30	30			
4-Bromophenyl phenyl ether	101-55-3	2	0.731	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroisopropyl)ether	108-60-1	2	0.696	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethoxy)methane	111-91-1	5	0.626	ug/l	40-140	30	40-140	30	30			
Hexachlorobutadiene	87-68-3	2	0.658	ug/l	40-140	30	40-140	30	30			
Hexachlorocyclopentadiene	77-47-4	20	7.84	ug/l	40-140	30	40-140	30	30			
Isophorone	78-59-1	5	0.601	ug/l	40-140	30	40-140	30	30			
Nitrobenzene	98-95-3	2	0.753	ug/l	40-140	30	40-140	30	30			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	2	0.644	ug/l	40-140	30	40-140	30	30			
n-Nitrosodi-n-propylamine	621-64-7	5	0.7	ug/l	29-132	30	29-132	30	30			
Bis(2-Ethylhexyl)phthalate	117-81-7	3	0.91	ug/l	40-140	30	40-140	30	30			
Butyl benzyl phthalate	85-68-7	5	1.26	ug/l	40-140	30	40-140	30	30			
Di-n-butylphthalate	84-74-2	5	0.689	ug/l	40-140	30	40-140	30	30			
Di-n-octylphthalate	117-84-0	5	1.14	ug/l	40-140	30	40-140	30	30			
Diethyl phthalate	84-66-2	5	0.628	ug/l	40-140	30	40-140	30	30			
Dimethyl phthalate	131-11-3	5	0.65	ug/l	40-140	30	40-140	30	30			

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Roux Associates, Inc.
NYTCL-WATER
NYTCL Semivolatiles - EPA 8270D (WATER)

Holding Time: 7 days
Container / Sample Preservation: 2 - Amber 1000ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Biphenyl	92-52-4	2	0.757	ug/l	54-104	30	54-104	30	30			
4-Chloroaniline	106-47-8	5	0.632	ug/l	40-140	30	40-140	30	30			
2-Nitroaniline	88-74-4	5	1.14	ug/l	52-143	30	52-143	30	30			
3-Nitroaniline	99-09-2	5	1.14	ug/l	25-145	30	25-145	30	30			
4-Nitroaniline	100-01-6	5	1.3	ug/l	51-143	30	51-143	30	30			

Dibenzofuran	132-64-9	2	0.656	ug/l	40-140	30	40-140	30	30			
1,2,4,5-Tetrachlorobenzene	95-94-3	10	0.667	ug/l	2-134	30	2-134	30	30			
Acetophenone	98-86-2	5	0.847	ug/l	39-129	30	39-129	30	30			
2,4,6-Trichlorophenol	88-06-2	5	0.681	ug/l	30-130	30	30-130	30	30			
P-Chloro-M-Cresol	59-50-7	2	0.617	ug/l	23-97	30	23-97	30	30			
2-Chlorophenol	95-57-8	2	0.631	ug/l	27-123	30	27-123	30	30			
2,4-Dichlorophenol	120-83-2	5	0.769	ug/l	30-130	30	30-130	30	30			
2,4-Dimethylphenol	105-67-9	5	1.64	ug/l	30-130	30	30-130	30	30			
2-Nitrophenol	88-75-5	10	1.52	ug/l	30-130	30	30-130	30	30			
4-Nitrophenol	100-02-7	10	1.77	ug/l	10-80	30	10-80	30	30			
2,4-Dinitrophenol	51-28-5	20	5.47	ug/l	20-130	30	20-130	30	30			
4,6-Dinitro-o-cresol	534-52-1	10	2.1	ug/l	20-164	30	20-164	30	30			
Phenol	108-95-2	5	1.89	ug/l	12-110	30	12-110	30	30			
2-Methylphenol	95-48-7	5	1.02	ug/l	30-130	30	30-130	30	30			
3-Methylphenol/4-Methylphenol	106-44-5	5	1.11	ug/l	30-130	30	30-130	30	30			
2,4,5-Trichlorophenol	95-95-4	5	0.715	ug/l	30-130	30	30-130	30	30			
Benzoic Acid	65-85-0	50	12.9	ug/l	10-110	30	10-110	30	30			
Benzyl Alcohol	100-51-6	2	0.725	ug/l	15-110	30	15-110	30	30			
Carbazole	86-74-8	2	0.627	ug/l	55-144	30	55-144	30	30			
2-Fluorophenol	*367-12-4*									*21-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*15-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-120*		
4-Terphenyl-d14	*1718-51-0*									*41-149*		

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Roux Associates, Inc.
NYTCL-WATER
NYTCL Semivolatiles -EPA 8270D-SIM (WATER)

Holding Time: 7 days
Container / Sample Preservation: 2 - Amber 1000ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	0.1	0.035	ug/l	37-111	40	37-111	40	40			
2-Chloronaphthalene	91-58-7	0.2	0.035	ug/l	40-140	40	40-140	40	40			
Fluoranthene	206-44-0	0.1	0.038	ug/l	40-140	40	40-140	40	40			
Hexachlorobutadiene	87-68-3	0.5	0.036	ug/l	40-140	40	40-140	40	40			
Naphthalene	91-20-3	0.1	0.043	ug/l	40-140	40	40-140	40	40			
Benzo(a)anthracene	56-55-3	0.1	0.018	ug/l	40-140	40	40-140	40	40			
Benzo(a)pyrene	50-32-8	0.1	0.039	ug/l	40-140	40	40-140	40	40			
Benzo(b)fluoranthene	205-99-2	0.1	0.016	ug/l	40-140	40	40-140	40	40			
Benzo(k)fluoranthene	207-08-9	0.1	0.042	ug/l	40-140	40	40-140	40	40			
Chrysene	218-01-9	0.1	0.038	ug/l	40-140	40	40-140	40	40			
Acenaphthylene	208-96-8	0.1	0.035	ug/l	40-140	40	40-140	40	40			
Anthracene	120-12-7	0.1	0.035	ug/l	40-140	40	40-140	40	40			
Benzo(ghi)perylene	191-24-2	0.1	0.042	ug/l	40-140	40	40-140	40	40			
Fluorene	86-73-7	0.1	0.037	ug/l	40-140	40	40-140	40	40			
Phenanthrene	85-01-8	0.1	0.015	ug/l	40-140	40	40-140	40	40			
Dibenzo(a,h)anthracene	53-70-3	0.1	0.039	ug/l	40-140	40	40-140	40	40			
Indeno(1,2,3-cd)Pyrene	193-39-5	0.1	0.04	ug/l	40-140	40	40-140	40	40			
Pyrene	129-00-0	0.1	0.04	ug/l	26-127	40	26-127	40	40			
2-Methylnaphthalene	91-57-6	0.1	0.045	ug/l	40-140	40	40-140	40	40			
Pentachlorophenol	87-86-5	0.8	0.22	ug/l	9-103	40	9-103	40	40			
Hexachlorobenzene	118-74-1	0.8	0.032	ug/l	40-140	40	40-140	40	40			
Hexachloroethane	67-72-1	0.8	0.03	ug/l	40-140	40	40-140	40	40			
2-Fluorophenol	*367-12-4*									*21-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*15-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-120*		
4-Terphenyl-d14	*1718-51-0*									*41-149*		

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Roux Associates, Inc.
NYTCL-WATER
WETCHEM (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container
Chromium, Hexavalent	18540-29-9	0.01	0.003	mg/l	85-115	20	85-115	20	20	7196A	24 hours	1 - Plastic 500ml unpreserved
Cyanide, Total	57-12-5	0.005	0.0018	mg/l	85-115	20	80-120	20	20	9010C/9012A	14 days	1 - Plastic 250ml NaOH preserved

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Roux Associates, Inc.
AIR
Volatile Organics in Air: TO-15 (SOIL_VAPOR)

Holding Time: 30 days
Container / Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,1,1-Trichloroethane	71-55-6	0.2	0.057	ppbV	70-130			25	25			
1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.0548	ppbV	70-130			25	25			
1,1,2-Trichloroethane	79-00-5	0.2	0.0667	ppbV	70-130			25	25			
1,1-Dichloroethane	75-34-3	0.2	0.0771	ppbV	70-130			25	25			
1,1-Dichloroethene	75-35-4	0.2	0.0566	ppbV	70-130			25	25			
1,2,4-Trichlorobenzene	120-82-1	0.2	0.0611	ppbV	70-130			25	25			
1,2,4-Trimethylbenzene	95-63-6	0.2	0.0694	ppbV	70-130			25	25			
1,2-Dibromoethane	106-93-4	0.2	0.0779	ppbV	70-130			25	25			
1,2-Dichlorobenzene	95-50-1	0.2	0.0614	ppbV	70-130			25	25			
1,2-Dichloroethane	107-06-2	0.2	0.0552	ppbV	70-130			25	25			
1,2-Dichloropropane	78-87-5	0.2	0.0697	ppbV	70-130			25	25			
1,3,5-Trimethylbenzene	108-67-8	0.2	0.0584	ppbV	70-130			25	25			
1,3-Butadiene	106-99-0	0.2	0.0799	ppbV	70-130			25	25			
1,3-Dichlorobenzene	541-73-1	0.2	0.0637	ppbV	70-130			25	25			
1,4-Dichlorobenzene	106-46-7	0.2	0.0418	ppbV	70-130			25	25			
1,4-Dioxane	123-91-1	0.2	0.078	ppbV	70-130			25	25			
2,2,4-Trimethylpentane	540-84-1	0.2	0.0659	ppbV	70-130			25	25			
2-Butanone	78-93-3	0.5	0.0522	ppbV	70-130			25	25			
2-Hexanone	591-78-6	0.2	0.0604	ppbV	70-130			25	25			
3-Chloropropene	107-05-1	0.2	0.0812	ppbV	70-130			25	25			
4-Ethyltoluene	622-96-8	0.2	0.0776	ppbV	70-130			25	25			
Acetone	67-64-1	1	0.269	ppbV	70-130			25	25			
Benzene	71-43-2	0.2	0.0537	ppbV	70-130			25	25			
Benzyl chloride	100-44-7	0.2	0.0645	ppbV	70-130			25	25			
Bromodichloromethane	75-27-4	0.2	0.0656	ppbV	70-130			25	25			
Bromoform	75-25-2	0.2	0.0523	ppbV	70-130			25	25			
Bromomethane	74-83-9	0.2	0.0696	ppbV	70-130			25	25			
Carbon disulfide	75-15-0	0.2	0.0345	ppbV	70-130			25	25			
Carbon tetrachloride	56-23-5	0.2	0.0471	ppbV	70-130			25	25			
Chlorobenzene	108-90-7	0.2	0.0789	ppbV	70-130			25	25			
Chloroethane	75-00-3	0.2	0.0767	ppbV	70-130			25	25			
Chloroform	67-66-3	0.2	0.0452	ppbV	70-130			25	25			
Chloromethane	74-87-3	0.2	0.0958	ppbV	70-130			25	25			
cis-1,2-Dichloroethene	156-59-2	0.2	0.0587	ppbV	70-130			25	25			
cis-1,3-Dichloropropene	10061-01-5	0.2	0.0745	ppbV	70-130			25	25			
Cyclohexane	110-82-7	0.2	0.0656	ppbV	70-130			25	25			
Dibromochloromethane	124-48-1	0.2	0.0747	ppbV	70-130			25	25			
Dichlorodifluoromethane	75-71-8	0.2	0.0466	ppbV	70-130			25	25			
Ethyl Alcohol	GCDAI06	5	0.542	ppbV	70-130			25	25			
Ethyl Acetate	141-78-6	0.5	0.131	ppbV	70-130			25	25			
Ethylbenzene	100-41-4	0.2	0.0555	ppbV	70-130			25	25			
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.2	0.0511	ppbV	70-130			25	25			

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Roux Associates, Inc.
AIR
Volatile Organics in Air: TO-15 (SOIL_VAPOR)

Holding Time: 30 days
Container / Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	0.2	0.0419	ppbV	70-130			25	25			
Hexachlorobutadiene	87-68-3	0.2	0.0732	ppbV	70-130			25	25			
iso-Propyl Alcohol	67-63-0	0.5	0.114	ppbV	70-130			25	25			
Methylene chloride	75-09-2	0.5	0.188	ppbV	70-130			25	25			
4-Methyl-2-pentanone	108-10-1	0.5	0.0607	ppbV	70-130			25	25			
Methyl tert butyl ether	1634-04-4	0.2	0.0452	ppbV	70-130			25	25			
Methyl Methacrylate	80-62-6	0.5	0.148	ppbV	70-130			25	25			
p/m-Xylene	179601-23-1	0.4	0.139	ppbV	70-130			25	25			
o-Xylene	95-47-6	0.2	0.0631	ppbV	70-130			25	25			
Xylene (Total)	1330-20-7	0.2	0.0631	ppbV	70-130			25	25			
Heptane	142-82-5	0.2	0.0553	ppbV	70-130			25	25			
n-Heptane	142-82-5	0.2	0.0553	ppbV	70-130			25	25			
n-Hexane	110-54-3	0.2	0.0518	ppbV	70-130			25	25			
Propylene	115-07-1	0.5	0.0929	ppbV	70-130			25	25			
Styrene	100-42-5	0.2	0.0799	ppbV	70-130			25	25			
Tetrachloroethene	127-18-4	0.2	0.0758	ppbV	70-130			25	25			
Tetrahydrofuran	109-99-9	0.5	0.0622	ppbV	70-130			25	25			
Toluene	108-88-3	0.2	0.0628	ppbV	70-130			25	25			
trans-1,2-Dichloroethene	156-60-5	0.2	0.074	ppbV	70-130			25	25			
1,2-Dichloroethene (total)	540-59-0	0.2	0.0587	ppbV	70-130			25	25			
trans-1,3-Dichloropropene	10061-02-6	0.2	0.0693	ppbV	70-130			25	25			
1,3-Dichloropropene, Total	542-75-6	0.2	0.0693	ppbV	70-130			25	25			
Trichloroethene	79-01-6	0.2	0.071	ppbV	70-130			25	25			
Trichlorofluoromethane	75-69-4	0.2	0.0416	ppbV	70-130			25	25			
Vinyl acetate	108-05-4	1	0.0567	ppbV	70-130			25	25			
Vinyl bromide	593-60-2	0.2	0.0699	ppbV	70-130			25	25			
Vinyl chloride	75-01-4	0.2	0.0533	ppbV	70-130			25	25			
Naphthalene	91-20-3	0.2	0.0432	ppbV	70-130			25	25			
Propane	74-98-6	0.5	0.114	ppbV	70-130			25	25			
Acrylonitrile	107-13-1	0.5	0.079	ppbV	70-130			25	25			
Acrolein	107-02-8	0.5	0.114	ppbV	70-130			25	25			
1,1,1,2-Tetrachloroethane	630-20-6	0.2	0.0547	ppbV	70-130			25	25			
Isopropylbenzene	98-82-8	0.2	0.043	ppbV	70-130			25	25			
1,2,3-Trichloropropane	96-18-4	0.2	0.0767	ppbV	70-130			25	25			
Acetonitrile	75-05-8	0.2	0.0761	ppbV	70-130			25	25			
Bromobenzene	108-86-1	0.2	0.079	ppbV	70-130			25	25			
Chlorodifluoromethane	75-45-6	0.2	0.0626	ppbV	70-130			25	25			
Dichlorofluoromethane	75-43-4	0.2	0.0572	ppbV	70-130			25	25			
Dibromomethane	74-95-3	0.2	0.0476	ppbV	70-130			25	25			
Pentane	109-66-0	0.2	0.0475	ppbV	70-130			25	25			
Octane	111-65-9	0.2	0.0421	ppbV	70-130			25	25			
Tertiary-Amyl Methyl Ether	994-05-8	0.2	0.0795	ppbV	70-130			25	25			

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Roux Associates, Inc.
AIR
Volatile Organics in Air: TO-15 (SOIL_VAPOR)

Holding Time: 30 days
Container / Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
o-Chlorotoluene	95-49-8	0.2	0.0487	ppbV	70-130			25	25			
p-Chlorotoluene	106-43-4	0.2	0.0764	ppbV	70-130			25	25			
2,2-Dichloropropane	594-20-7	0.2	0.0581	ppbV	70-130			25	25			
1,1-Dichloropropene	563-58-6	0.2	0.0715	ppbV	70-130			25	25			
Isopropyl Ether	108-20-3	0.2	0.0656	ppbV	70-130			25	25			
Ethyl-Tert-Butyl-Ether	637-92-3	0.2	0.0515	ppbV	70-130			25	25			
1,2,3-Trichlorobenzene	87-61-6	0.2	0.0436	ppbV	70-130			25	25			
Ethyl ether	60-29-7	0.2	0.0591	ppbV	70-130			25	25			
n-Butylbenzene	104-51-8	0.2	0.0639	ppbV	70-130			25	25			
sec-Butylbenzene	135-98-8	0.2	0.0731	ppbV	70-130			25	25			
tert-Butylbenzene	98-06-6	0.2	0.0402	ppbV	70-130			25	25			
1,2-Dibromo-3-chloropropane	96-12-8	0.2	0.0744	ppbV	70-130			25	25			
p-Isopropyltoluene	99-87-6	0.2	0.0608	ppbV	70-130			25	25			
n-Propylbenzene	103-65-1	0.2	0.0559	ppbV	70-130			25	25			
1,3-Dichloropropane	142-28-9	0.2	0.0776	ppbV	70-130			25	25			
Methanol	67-56-1	5	0.736	ppbV	70-130			25	25			
Butane	106-97-8	0.2	0.0442	ppbV	70-130			25	25			
Nonane (C9)	111-84-2	0.2	0.0644	ppbV	70-130			25	25			
Decane (C10)	124-18-5	0.2	0.0484	ppbV	70-130			25	25			
Undecane	1120-21-4	0.2	0.0528	ppbV	70-130			25	25			
Dodecane (C12)	112-40-3	0.2	0.0564	ppbV	70-130			25	25			
Butyl Acetate	123-86-4	0.5	0.114	ppbV	70-130			25	25			
tert-Butyl Alcohol	75-65-0	0.5	0.0599	ppbV	70-130			25	25			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
Toluene-d8	*2037-26-5*									*70-130*		
Bromofluorobenzene	*460-00-4*									*70-130*		

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PFAAs via EPA 537(M)-Isotope Dilution (WATER)

Holding Time: 14 days
Container/Sample Preservation: 1 - 3 Plastic Trizma/1 Plastic/1 H20+Trizma

Analyte	CAS #	RL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorobutanoic Acid (PFBA)	375-22-4	2	ng/l	50-150	30	50-150	30	30			
1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2) 6:2FTS	27619-97-2	2	ng/l	50-150	30	50-150	30	30			
PERFLUOROHEPTANESULFONIC ACID (PFHPS)	375-92-8	2	ng/l	50-150	30	50-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	2	ng/l	50-150	30	50-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	2	ng/l	50-150	30	50-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	NONE	2	ng/l	50-150	30	50-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	2	ng/l	50-150	30	50-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	2	ng/l	50-150	30	50-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	2	ng/l	50-150	30	50-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	2	ng/l	50-150	30	50-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	2	ng/l	50-150	30	50-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	2	ng/l	50-150	30	50-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	2	ng/l	50-150	30	50-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	2	ng/l	50-150	30	50-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	2	ng/l	50-150	30	50-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	2	ng/l	50-150	30	50-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	2	ng/l	50-150	30	50-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	2	ng/l	50-150	30	50-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	2	ng/l	50-150	30	50-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	2	ng/l	50-150	30	50-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	2	ng/l	50-150	30	50-150	30	30			
Perfluorododecanoic Acid (PFDoA)	307-55-1	2	ng/l	50-150	30	50-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	2	ng/l	50-150	30	50-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	2	ng/l	50-150	30	50-150	30	30			
Perfluoro[13C4]Butanoic Acid (MPFBA)	NONE								50-150		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	NONE								50-150		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	NONE								50-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	NONE								50-150		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	NONE								50-150		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	NONE								50-150		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	NONE								50-150		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	NONE								50-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	NONE								50-150		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	NONE								50-150		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	NONE								50-150		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	NONE								50-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	NONE								50-150		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	NONE								50-150		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	NONE								50-150		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	NONE								50-150		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	NONE								50-150		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	NONE								50-150		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	NONE								50-150		

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1,4-Dioxane via 8270SIM

Holding Time: 7 days
Container/Sample Preservation: 500 mL amber glass jar/ no preservative

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,4-Dioxane	123-91-1	0.15	0.075	ug/l	40-140	30	40-140	30	30			
1,4-Dioxane-d8	*17647-74-4*									*15-110*		

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APPENDICES

A. Professional Profiles

B. QA Glossary

APPENDIX A

Professional Profiles

ROUX

Professional Profile

Frank Cherena
Principal Geologist

Technical Specialties:
Project Management and Field Management of Phase I and Phase II Environmental site assessments. GIS data analysis and mapping. Project Management and oversight of remediation and construction activities. Additional experience includes the performance of investigation design and agency correspondence for petroleum and chlorinated solvent remediation projects.

Experience Summary:
Ten years of experience: Senior Geologist with Roux Associates, Inc., Islandia, New York; Staff Geologist with RTP Environmental Associates, Inc., Green Brook, New Jersey.

Credentials:
B.A., Geology, Colgate University, 2003
OSHA 40-Hour Hazardous Materials Training, 2003
OSHA 8-Hour Supervisor Training, 2004
Accredited AHERA Inspector, 2004
State of New York Asbestos Inspector Certificate, 2004
NJ UST Subsurface Evaluator Certification# 491925, 2009

Key Projects

- Project Manager for the largest redevelopment project in New York City (over $4.5 billion). Project includes Phase I and Phase II ESAs (investigation of soil, groundwater, and soil vapor) at over 75 properties; Construction support for excavation of one million cubic yards of soil including implementing an in situ waste characterization program; Environmental support for demolition, asbestos and lead abatement, site remediation using In Situ Chemical Oxidation, and relocating of an active 9 acre 100 year old railyard; Property acquisition support throughout the project (7 city blocks); and Agency support for NYSDEC, NYCDEP, MTA (LIRR/NYCT), and ESDC. The environmental data was used as an integral component of the New York State Environmental Quality Review Act (SEQRA) final Environmental Impact Statement (EIS). The project will encompass 336,000 sq ft of office space, 6.4 million sq ft of residential space, an 18,000 seat sports and entertainment venue - the Barclays Center (home of the Nets professional basketball team) - 247,000 sq ft of retail space, a 165,000 square-foot hotel, and over 8 acres of intricately designed publicly accessible open space.
- Implemented GIS analysis and mapping for a remedial study and alternative analysis report (AAR) for an active petroleum storage terminal in Buffalo, New York under jurisdiction of the NYSDEC. The AAR required spatial analyses in order to categorize and analyze contaminant data from multiple investigations, investigate remedial alternatives, and to help focus ongoing additional investigations.
- Project Manager for a residential redevelopment of a former Manufactured Gas Plant (MGP) Site in Chelsea Manhattan. Designed waste characterization investigation, and directed contractor under remedial action plan to remove New York City Department of Environmental Protection (NYCDEP) "E" designations for the property. Activities also included hazardous materials removal and correspondence with state and local agencies.
- Project manager for a property transfer support project at a heavily contaminated state-of-the-art distribution facility in the Bronx, New York. The site was a former MGP being handled under the VCP in central office, the site had an open spill under the regional spills group and the site was attempting to apply to the BCP through the regional office. Roux performed a Phase I for the buyer, a Phase II and remedial cost estimate for the owner and negotiated with the buyer's consultant and NYSDEC to limit the scope of the investigation and cleanup.
- Project Manager for investigation and review of a former electroplating facility in Bay Shore, New York with chlorinated solvent DNAPL. Activities included historical document review, subsurface investigation, and coordination with outside legal counsel and NYSDEC.
- Project Manager of a lease negotiation and redevelopment project at a former industrial property in New York, New York. Services provided included lease negotiation support and investigation of numerous areas of concern associated with former property usages.
- Project Manager of numerous due diligence projects for owners, developers, managers, municipalities and lenders at commercial and industrial properties throughout the Northeast. Activities included performance of UST evaluations and closures, hot spot remediations, Phase I and Phase II Site Assessments, vapor intrusion studies and mitigation, lead based paint, asbestos and hazardous materials surveys, interaction with regulatory agencies on behalf of clients and development of remedial cost estimates for planning and negotiation.
- Field Manager of demolition of a former warehouse located at a regional rail yard in Sunnyside, New York. Activities included continuous air monitoring for worker and community safety along with waste characterization and tracking. Prepared detailed reports to client regarding contractor progress and the status of waste disposal program.
- Performed numerous Phase I Environmental Site Assessments according to ASTM E1527-00 and ASTM E1527-05 for due diligence of large retail shopping centers, industrial facilities, and office buildings. Associated activities included agency contact, database management and interpretation, report preparation, and recommendations for additional work.
- Conducted asbestos surveys of industrial and commercial facilities for due diligence investigations including sampling and data interpretation of Asbestos Containing Material (ACM).
- Analyzed complex spatial engineering data using GIS and researched historical manufacturing information for a litigation case concerning asbestos use in railcar manufacturing and maintenance facilities.
- Conducted groundwater and soil sampling surveys according to NJDEP remediation standards following the removal of underground storage tanks at several commercial facilities located in New Jersey.

ROUX

Professional Profile

Jeffrey Wills
Senior Hydrogeologist

Technical Specialties:
Design, implementation, and management of remedial investigations and Phase II ESAs. New York State Brownfields Cleanup Program; Program; New York City Office of Environmental Remediation Voluntary Cleanup Program; and Inactive Hazardous Wastes Site Program and Spills.

Experience Summary:
Nine years of experience: Staff Assistant Scientist, Staff Geologist, Project Hydrogeologist and Senior Hydrogeologist with Roux Associates, Inc., Islandia, New York.

Credentials:
B.S., Environmental Resources/Geology, Hofstra University, 2006
Co-author, *Post-Alleghenian Deformation of the Shawangunk Ridge in New York and New Jersey*, 2005
OSHA 40-Hour HAZWOPER Training: 2006
OSHA 8-Hour Refresher: 2014
Loss Prevention Systems Training Certification: 2008
Loss Prevention Systems Training Refresher: 2014

Key Projects

- Project Manager for a site in the New York State Brownfields Cleanup Program. The site was formally used for the manufacturing and storage of disinfectants, soaps and pesticides located in Long Island City, New York. This project included due diligence environmental investigations that identified a large creosote plume beneath portions of the site as well as 45 subsurface vaults/kettles, which contained chemicals used for the manufacturing of disinfectants, soaps and pesticides as well as in situ waste characterization sampling program and a Remedial Action Work Plan, which included the removal of the 45 subsurface vaults/kettles contents and structures and excavation of soils below grade and management of soil.
- Project Manager for a 13 acre redevelopment site in Norwalk, Connecticut. The site was formally used for multiple gasoline service stations, automotive repair shops and a waste hauler and storage. This project included due diligence environmental investigations, site-wide in situ waste characterization sampling program and a Remedial Action Plan and management of soil excavations.
- Project Manager for a former dry cleaner site in Plainview, New York. This project included a remedial investigation to identify source(s) of impacted soil, groundwater and soil vapor as well as the preparation of Feasibility Study and Remedial Action Work Plan.
- Field Manager for a 40,000 square foot facility in the New York State Brownfields Cleanup Program located in Williamsburg, Brooklyn. The site was formally a storage and distributer of dry cleaner chemicals. Remedial investigation work included the collection of soil, groundwater and soil vapor samples as well as the installation of multiple groundwater monitoring wells. Responsibilities included the oversight of all field work, site management, scheduling and coordination with Subcontractors, invoicing and compliance with NYSDEC regulations.
- Field Manager for a site in the New York State Brownfields Cleanup Program. The site was formally a used car dealership in Corona, Queens, New York. This project included in situ chemical oxidation injection program utilizing RegenOx™ oxidant compound, which was injected into 40 injection points throughout the site. Responsibilities included: Site management; budgeting; scheduling, coordination, and negotiations with subcontractors; post-injection groundwater monitoring, and USEPA and NYSDEC compliance, review and evaluation of laboratory data and reporting.
- Project Hydrogeologist responsible for the management of investigation and remediation at various mixed development sites containing hazardous and non-hazardous soils in New York City. These projects included the implementation of Remedial Investigations, in situ waste characterization sampling program and a Remedial Action Work Plan, which included excavation of soils below grade and management of soils including transportation and disposal and coordination with various disposal facilities. Some of these sites were accepted into the New York City Office of Environmental Remediation (NYC OER) and Brownfield Cleanup Program (BCP).
- Project manager for an 11 acre redevelopment site in the New York State Volunteer Cleanup Program. The site was formally a Steel Factory located in Manorhaven, New York. Completed multiple soil and groundwater investigations as well as utilized Membrane Interface Probe (MIP) technology and Cone Penetration Test (CPT) to delineate both the extent of contamination plume and subsurface geology; Responsibilities included MIP/CPT oversight, monitoring well installation, collection of soil and groundwater samples and construction of geological cross-sections; Supervised a challenging four phase In Situ chemical oxidation (ISCO) injection program that utilized RegenOx™ oxidant compound, which was injected into over 120 injection points throughout the site; Responsibilities included: Site management, budgeting, implementation of a pressure

Jeffrey Wills
Senior Hydrogeologist

pulse technology (Sidewinder tool) pilot study, scheduled and coordinated with subcontractors, post-injection groundwater monitoring, USEPA and NYSDEC compliance, review and evaluation of laboratory data and reporting.

- Field Manager for the investigation and remediation of chlorinated volatile organic compounds (CVOCs) at an active shopping center in Parsippany, New Jersey. Field activities included the completion of soil and groundwater sampling activities as well as groundwater monitoring well installations and abandonments. Remedial action activities included the injection of zero valent iron and emulsified vegetable oil (ZVI/EVO) at 28 temporary injection borings throughout the impacted portion of the site. Responsibilities included: site management, oversight for all field work; budgeting, scheduled and coordinated with subcontractors, post-injection groundwater monitoring, compliance with NJDEP regulations, review and evaluation of laboratory data and reporting.
- Field Investigations Manager for Phase II Remedial Investigations associated with petroleum contamination at a former petroleum refinery and terminal in Brooklyn, New York. The field investigations included the completion of cone penetrometer test (CPT) and laser induced fluorescence (LIF) soil borings, a membrane interface probe (MIP) investigation, installation and development of over 50 groundwater monitoring wells, installation of 30 permanent soil vapor monitoring points, completion of trial borings, design of free-product recovery wells, abandonment of multiple groundwater monitoring and product recovery wells.
- Field Manager of an annual soil vapor monitoring program for a former petroleum refinery and terminal in Brooklyn, New York. Field work included the sampling and screening of 100 permanent soil vapor monitoring points and the screening of indoor air within multiple buildings for soil vapor intrusion monitoring.
- Site/Field manager at 100+ facilities owned and/or operated by various city agencies in New York City, Brooklyn, Queens and Staten Island. Responsibilities included supervising and conducting soil, groundwater and soil vapor sampling work under NYSDEC-approved work plans; Responsible for the preparation of quarterly/semiannual monitoring reports and construction of groundwater contour maps and geologic cross-sections for submittal to NYSDEC; Evaluation of field data and preparation of soil boring and well construction logs using gINT© software; Assisted in scheduling and coordinating with subcontractors (drillers, surveyors, enhanced fluid recovery [EFR] events) as well as review subcontractors work invoices. Provided oversight during the installation of several monitoring wells at multiple Sites throughout Brooklyn, Queens, and Staten Island, New York; Responsibilities included health and safety supervision for utility clearances, soil sampling, recording of lithology, well development, and groundwater sampling.
- Field manager for multiple soil investigations at Department of Sanitation (DOS) garages in Staten Island, New York; Responsibilities included negotiating the scope of work with the DOS Supervisor, scheduling of work and collection of soil and groundwater samples; Supervised surveying of monitoring wells and geophysical surveying using ground penetrating radar to locate petroleum underground storage tanks and affiliated piping.
- Field manager for several enhanced bioremediation programs at NYPD precincts and NYC Parks facilities, which included the installation of multiple oxygen releasing compound (ORC) injection point wells.
- Performed field investigations for petroleum contamination at FDNY Engine Company 243, New York, Responsibilities included location of former AST area, interviewing of FDNY employees, and gathering of historical records.
- Field manager for well decommissioning at various sites in Brooklyn, New York; Additional responsibilities included the preparation of well decommissioning logs for submittal to NYSDEC.
- Field manager for sub-slab soil vapor sampling at a factory in Deer Park, New York.
- Assisted in the collection of wall rinsate samples for a hazardous-waste Site in Brooklyn, New York.

ROUX

Professional Profile

Kathryn Sommo, CPESC, ISA Arborist
Senior Scientist
Islandia, NY

Technical Specialties:
Soil, Sediment, Groundwater and Soil Vapor Investigation Sediment Characterization for Ecological Impacts, Waste Management, Construction Management, Wetland Mitigation and Restoration, Sensitive Area Monitoring Well Installation, Hydrologic Studies, Wetland Delineation, Wetland and SPDES/NPDES Reporting & Permitting, Constructed Treatment Wetland (CTW) System Design Management, OM&M, Wetland Assessments, Habitat Evaluations, Rare, Threatened & Endangered (RTE) Species Surveys, Litigation Support and Phytoremediation.

Experience Summary:
Fifteen years of experience with Roux Associates.
Five years' experience as a Biologist with the U.S. Forest Service, Colorado Division of Wildlife, and Colorado Natural Heritage Program.

Credentials:
B.S. Fishery Biology, Colorado State University, 1998
Wetland Delineation Certification, Richard Chinn Environmental Training, 2000
Winter Plant Identification Certification, Rutgers University, 2011.
RTE Species of New Jersey, Rutgers University, 2012
International Society of Arboriculture (ISA) Certified Arborist
Certified Professional in Erosion and Sediment Control (CPESC)
OSHA 40-Hour Health and Safety Course

Professional Affiliations:
Society of Wetland Scientists, Society for Ecological Restoration, Xerces Society for Invertebrate Conservation, ISA New York Chapter, Environmental Professionals' Organization of Connecticut

Key Projects:

- Wetland delineation experience in freshwater and tidal wetland areas throughout Middlesex, Bergen and Ocean Counties in New Jersey, Suffolk, Nassau, Richmond, Kings Onondaga, Duchess, Rensselaer Counties in New York, Fairfield County in Connecticut, Providence County in Rhode Island, Plymouth, Bristol, Worcester and Essex Counties in Massachusetts, and Bucks County in Pennsylvania.
- Project Management for groundwater monitoring for several major railroad transportation companies and bus transportation terminals located throughout New Jersey. Completed quarterly and annual reporting for groundwater compliance monitoring programs.
- Project Manager for remedial investigatin at a former aerospace manufacturing facility located in Wallingford, CT. Site contamination included chlorinated hydrocarbons petroleum related VOCS and metals in soils and groundwater An air/sparge soil vapor extraction (AS/SVE) system was installed to address soil and groundwater contamination from the flow meter testing area.. Work activities have included: quarterly groundwater monitoring, writing and implementation of subsurface investigation Work Plans, review and analysis of laboratory analytical data, and reporting of investigation results, completion of a Sensitive Receptor Survey, Water Supply Well Survey, Ecological Scoping Checklist, RCRA Corrective Action Forms (Current Human Exposures Under Control -CA-725 & Migration of Contaminated Groundwater Under Control - CA750) and the Conceptual Site Model.
- Project Manager for feasibility study and engineering design to reroute additional stormwater to constructed treatment wetland (CTW) system in Portsmouth, Virginia. Zinc and copper were the primary constituents targeted for treatment in the CTW system. Components of the work included, stormwater runoff modeling analysis, mass loading calculations, constructed treatment wetland performance and life expectancy calculations and alternatives analysis. NPDES reporting and permitting renewal.
- Project Manager for post-remediation documentation for a former colorants facility in Rensselaer, New York. Ongoing work activities include, updates to the Site Management Plan for OU-1 and OU-2, Periodic Review Reporting for the groundwater monitoring, groundwater treatment system, soil vapor barrier and landfill cap.
- Project Manager for wetland delineation, RTE survey and wetlands permitting at an active metals smeltering facility in Sayerville, NJ. The project design elements included the design and construction of an engineered Constructed Treatment Wetland system that will provide treatment of stormwater run-off from the facility prior to discharge from the site. RTE surveys of the wetlands and wetland buffer areas were required for the potential presence of threatened and endangered species.
- Wetland Specialist for Subsurface Stormwater Treatment Wetlands (SSTW) systems being installed to capture and treat stormwater runoff from the MassDOT Longfellow bridge rehabilitation project. The SSTWs will be installed in both Cambridge and Boston Massachusetts. The project components include SSTW design review, planting recommendations, construction oversight and documentation and vegetation monitoring.
- Project Manager for City of Glen Cove, Mill Pond rehabilitation project. Design objectives were to restore improve the functionality of Mill Pond to treat stormwater runoff and baseflow from Cedar Swamp Creek and the surrounding watershed, improve solids removal, surface water flow and access for maintenance activities. Elements of the design included: reestablishment of forebay for sediment removal, excavation of sediment deposition areas, concrete revetment berm/ access road and removable weir plate for forebay maintenance, wooden headwall replacement, improve surface water flow deflection, and floatables collection system to prevent debris from entering Hempstead Harbor. Completed all wetland permitting for USACE, NYSDEC and NYSDOS. Negotiated soil disposal facilities options with NYSDEC.
- Project Manager for former fibers facility in Williamsburg, VA; project components include land management for wildlife enhancement projects, Phytotechnology monitoring, and permitting. Baseline vegetation survey completed including mapping of all habitat types present. Wildlife monitoring surveys for bats, birds, amphibians, reptiles, mammals and insects. Wildlife projects implemented include creation of pollinator meadow areas, warm season grasslands, sustainable forestry management, purple martin colony, blue bird trail, bat housing, native bee housing, and vernal pool monitoring. Wildlife Habitat Council Wildlife at Work certification earned for wildlife projects. Other project work consisted of phytoremediation tree plot monitoring, evaluation and recommendation for fertilization and maintenance;. Virginia Pollutant Discharge Elimination System (VPDES) permit renewal.
- Completed a phytoremediation feasibility study for a Site in Ogdensburg, New York. The project encompassed creating an aesthetically pleasing landscape planting plan, which would be comprised of native flora with deep rooting potential capable of hydraulically containing the containment plume.
- Project Manager for benthic community evaluation for waterfront redevelopment site located within an inlet of the East

Kathryn Sommo, CPESC, ISA Arborist

Senior Scientist

Islandia, NY

River and greater NYC harbor area. Completed benthic, sediment and surface water sampling to evaluate the effects of the contaminated sediment on the benthic community. Work performed in support of the creation of tidal marshes, provision of benthic habitat structures, and the partial removal of a bulkhead to provide public access to the created water feature.

- Project Manager for wetland delineation, sediment sampling and characterization, and assessment of wetland vegetative communities present within a two mile stretch of the Peconic River in Brookhaven, New York. The project included sediment removal and wetland restoration for the remediation of metal contaminated sediments in the emergent marsh and forested riparian wetland system. Project manager for the restoration monitoring, supplemental planting, and invasive species control activities.
- Field Manager for sediment investigation and wetland vegetation encroachment control at a former petroleum bulk storage facility in Staten Island, New York. Wetland investigation, remediation and restoration project for a 440-acre former Major Oil Storage Facility containing approximately 95 acres of tidal and freshwater wetlands. As part of a Consent Order between the client and the NYSDEC, Roux developed and implemented a remedial design that minimized impacts to the wetlands while ensuring the protection of human health, wildlife and the surrounding environment. The remedial design included excavation and offsite disposal of 21,000 CY of sediment over 10 acres of wetlands.Achieved regulatory closure of the wetland restoration within two years of monitoring.
- Field Manager for landfill leachate investigation in Holtsville, New York. Downgradient pond and surface water tributary impacted from landfill leachate. Investigation activities included oversight of well installation, well development, the collection of groundwater, surface water and sediment samples, staff gauge installation piezometer installation and stream flow readings. Completed inventory of soils and vegetation within the landfill. Designed planting plan for pond restoration and completed permit application for restoration of the pond and surrounding uplands.
- Field Manager for coastal shoreline stabilization and grassland mitigation of an 80 acre island located off the coast of Brooklyn, NY. The island formally served as a municipal landfill and due to erosion forces the landfill waste became exposed. The design provided slope stabilization improvements and the creation of warm season maritime grasslands to provide foraging, cover and nesting habitat for birds. An inventory of the island vegetation was completed as well as soil, sediment and surface water samples to fully characterize the nature and depth to the landfill waste. Wetland permitting was completed to mitigate for the impacts to the wetland and adjacent areas.
- Field manager for a former petroleum bulk storage facility in Greenport, New York. Work activities included soil and groundwater sampling, creation of groundwater flow maps, soil and monitoring well profiles.
- Project Manager for benthic community evaluation for waterfront redevelopment site located within an inlet of the East River and greater NYC harbor area. Completed benthic, sediment and surface water sampling to evaluate the effects of the contaminated sediment on the benthic community. Work performed in support of the creation of tidal marshes, provision of benthic habitat structures, and the partial removal of a bulkhead to provide public access to the created water feature.
- Project Manager and Field Manager for the delineation and assessment of a shrub forested freshwater riparian wetland located along the Branch Brook Nature Preserve in Smithtown, NY. A hydrologic monitoring well network and vegetation monitoring plots established within the recovery system potential downgradient area. Water level monitoring conducted to pre and post recovery system startup to determine any effects to wetland resources. Prevalence Index (PI) scores used to evaluate shifts in vegetation composition within monitoring plots overtime. Designed planting plan for restoration of the disturbed upland adjacent well installation areas.
- Expert biologist project support provided for evaluation of natural resource damage (NRD) claims and determination of monetary compensation for damages. Sites for NRD claims located throughout the northeast, southeast and Midwest. Mitigation banks consulted throughout these areas for potential available credits and the unique requirements per area for mitigation banking reviewed. Wetland status and potential damages assumed for Site and value of the land determined based upon various mitigation evaluation methods. Habitat Equivalency Analysis (HEA) software utilized to evaluate timeline of impacted Sites and time required for complete Site restoration as applicable.
- Project Manager for litigation support provided to Southampton community members. Services included review of Town of Southampton wetland delineation of proposed project Site, expert review and commentary provided on Towns redevelopment plans and provision of verbal support at several town hearings regarding potential impacts to the Site and permitting requirements.
- Wetland specialist for restoration monitoring within restored emergent marsh and forested wetlands at former Chemical manufacturing facility located in Middleborough, Massachusetts. The 59-acre site was formerly used to manufacture chlorinated solvents remediation was required under an Administrative Consent Order issued by Massachusetts Department of Environmental Protection (MADEP). The swale and former lagoon area were filled and re-graded to remove ecological exposure pathways. Approximately one acre of wet meadow, shrub swamp and forested wetlands were restored.
- Wetland Permitting Specialist for redevelopment project located within wetland adjacent area in New York City. Development plans included multi-building, mixed-use development for affordable housing and commercial space. The project components included jurisdictional negotiation with NYSDEC, completion of restoration design plans, and sediment and erosion control plans and submittal of wetland permitting package.
- Field Manager of remediation activities for impacted wetland and transition areas. Prepared the wetland permit application, and provided regulatory support to obtain the required state approvals to perform regulated activities within and adjacent to the delineated wetlands located on an active bulk storage, receiving and transfer facility for petroleum and chemical products in Carteret, New Jersey.
- Field manager for a 3.2 acre pond remediation and restoration located in Massapequa Preserve on Long Island, New York. Wetland delineation verification. Inventory of open water and wetland vegetation completed and a delineation of the sediment depth. Assisted in development of design and restoration planting plan for permitting to remove impacted sediments and restore the pond and associated wetlands with native emergent wetland plants surrounded by shrub forest.

ROUX

Professional Profile

Ronald Lombino II
Project Hydrogeologist

Technical Specialties:
Design, implementation, and management of remedial investigations and Phase II ESAs. New York State Brownfields Cleanup Program; New York City Office of Environmental Remediation Voluntary Cleanup Program. Application of computer models to solve hydrogeologic problems. Investigation and evaluation of petroleum-related and chlorinated solvent contamination. Completion of remedial investigations, environmental site assessments, aquifer testing, remediation oversight, and demolition oversight.

Experience Summary:
Five years' experience: Staff Assistant Geologist, Staff Geologist, Project Hydrogeologist with Roux Associates, Inc., Islandia, New York.

Credentials:
B.S., Geology, Hofstra University, 2012.
OSHA 40-Hour Health and Safety Course, 2012
OSHA 10-Hour Outreach Construction Training
OSHA 8-Hour Annual Refresher Course
DOT Hazardous Waste Shipping Training
Loss Prevention System (LPS) Awareness, 8-Hour Certified
First Aid and CPR Certified
Transportation Worker Identification Credential (TWIC) Certification

Key Projects

- Project Hydrogeologist responsible for the management of investigation and remediation at various mixed development sites containing hazardous and non-hazardous soils in New York City. These projects included the implementation of Remedial Investigations, in situ waste characterization sampling program and a Remedial Action Work Plan, which included excavation of soils below grade and management of soils including transportation and disposal and coordination with various disposal facilities. Some of these sites were accepted into the New York City Office of Environmental Remediation (NYCOER) and Brownfield Cleanup Program (BCP).
- Field Manager for a 40,000-square foot facility in the New York State Brownfields Cleanup Program located in Williamsburg, Brooklyn. The site was formally a storage and distributer of dry cleaner chemicals. Remedial investigation work included the collection of soil, groundwater, and soil vapor samples as well as the installation of multiple groundwater monitoring wells. Responsibilities included the oversight of all field work, site management, scheduling and coordination with Subcontractors, invoicing, and compliance with NYSDEC regulations.
- Field Manager addressing the largest subsurface free-product plume in North America at a former petroleum refinery and terminal in Brooklyn, New York. Responsibilities include construction oversight of subcontractors, implementation of site specific health and safety plan. Tasks include: implementation of cone penetrometer testing (CPT) soil boring programs, installation of single and double cased monitoring wells using Sonic and Hollow Stem Auger drilling methods, classification of soil lithology, collection and screening of soil samples, development, and review of job safety analysis (JSA).
- Field manager for a vacuum enhanced recovery pilot study at an operational dual pump liquid extraction recovery well system at a former refinery and petroleum storage terminal in Brooklyn, New York. Field activities included the installation of the control manifold within the dual-phase extraction well along with air sampling from the recovery well and the SVE system, product, and groundwater sampling from the recovery well and surrounding monitoring wells, fluid level gauging, and monitoring of SVE system influent trends using a hydrocarbon flame ionization detector.
- Field Manager for an Aquifer Pump Test of a new Recovery Wells installed at a former petroleum refinery and terminal in Brooklyn, New York. Field activities associated with the pump test included testing the hydraulic conductivity of the surrounding well network to determine radius of influence by gauging and collecting LevelTroll Data.
- Construction oversight of sidewalk flag removal and installation. Field activities included coordination of contractors, disposal, monitoring of airborne dust and VOCs, reviewing contractor invoices, and providing contractor health and safety recommendations/action items in accordance with Occupational Safety and Health Administration requirements for trench safety.
- Field Manager for Phase IV Wavefront Water Flooding Pilot Study. Field activities included gauging over 80 Monitoring Wells, recording, entering, and reviewing data as well as downloading and uploading LevelTroll Data.
- Responsible for the maintenance and upkeep of over 300 monitoring wells at the former petroleum refinery and terminal in Brooklyn, New York.
- Responsible for the design of two new dual phase recovery wells at the former petroleum refinery and terminal in Brooklyn, New York. Field manager for the installation of the two new recovery wells.
- Field manager for multiple Remedial Investigation and Phase II Brownfield sites throughout Manhatten, Brooklyn, and Queens.
- Conducted community air monitoring for multiple sites.
- Conducted soil, groundwater and soil vapor sampling across multiple sites using multiple techniques for the collection of groundwater.

APPENDIX B

QA Glossary

QUALITY ASSURANCE GLOSSARY

"Alteration" means altering a sample collected for analysis in any way other than by adding a preservative, such as nitric acid to lower pH. Examples of alteration include, but are not limited to: filtering, settling and decanting, centrifuging and decanting and acid extracting.

“Analytical Services Protocol” or "ASP" means DEC’s compilation of approved EPA laboratory methods for sample preparation, analysis and data handling procedures.

“Correlation sample” means a sample taken, when using a field-testing technology, to be analyzed by an ELAP-certified laboratory to determine the correlation between the laboratory and field analytical results.

"Effective solubility" means the theoretical aqueous solubility of an organic constituent in groundwater that is in chemical equilibrium with a separate-phase (NAPL) mixed product (product containing several organic chemicals). The effective solubility of a particular organic chemical can be estimated by multiplying its mole fraction in the product mixture by its pure-phase solubility.

“Environmental Laboratory Accreditation Program” or “ELAP” means a program conducted by the NYSDOH which certifies environmental laboratories through on-site inspections and evaluation of principles of credentials and proficiency testing. Information regarding ELAP is available at the NYSDOH Wadsworth Laboratory website.

"Filtration" means the filtering of a groundwater or surface water sample, collected for metals analysis, at the time of collection and prior to preservation. Filtering includes but is not limited to the use of any membrane, fabric, paper or other filter medium, irrespective of pore size, to remove particulates from suspension.

“Final delineation sample” means a sample taken to make a decision regarding the extent of contamination at a site during the investigation and the design of the remedy or confirmation/ documentation sampling during remedial construction, which is to be analyzed by an ELAP-certified laboratory.

“Intermediate sample” means a sample taken during the investigation or remediation process that will be followed by another sampling event to confirm that remediation was successful or to confirm that the extent of contamination has been defined to below a level of concern.

"Method detection limit" or "MDL" means the minimum concentration of a substance detected and which can be reported with a reasonable degree of accuracy. It is the lowest concentration that can be measured, a lab-specific number, developed from minimum detection limits, and is also referred to as the practical quantitation limit (PQL).

“Nephelometric Turbidity Unit” or "NTU" is the unit by which turbidity in a sample is measured.

"Preservation" means preventing the degradation of a sample due to precipitation, biological action, or other physical/chemical processes between the time of sample collection and analysis. The most common examples involve refrigeration at 4 degrees Celsius and lowering sample pH by the addition of acid to keep dissolved metals in solution or to reduce the biodegradation of dissolved organic analytes.

"Target analyte list" or "TAL" means the list of inorganic compounds/elements designated for analysis as contained in the version of the EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration in effect as of the date on which the laboratory is performing the analysis. For the purpose of this chapter, a Target Analyte List scan means the analysis of a sample for Target Analyte List compounds/elements.

"Targeted compound" means a contaminant for which a specific analytical method is designed to detect that potential contaminant both qualitatively and quantitatively.

"Target compound list plus 30" or "TCL+30" means the list of organic compounds designated for analysis (TCL) as contained in the version of the EPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration in effect as of the date on which the laboratory is performing the analysis, and up to 30 non-targeted organic compounds (plus 30) as detected by gas chromatography/mass spectroscopy (GC/MS) analysis.

“Tentatively identified compound or TIC" means a chemical compound that is not on the target compound list but is detected in a sample analyzed by a GC/MS analytical method. TICs are only possible with methods using mass spectrometry as the detection technique. The compound is tentatively identified using a mass spectral instrumental electronic library search and the concentration of the compound estimated.

"Well development" means the application of energy to a newly installed well to establish a good hydraulic connection between the well and the surrounding formation. During development, fine-grained formation material that may have infiltrated the sand pack and/or well during installation is removed, allowing water from the formation to enter the well without becoming turbid and unrepresentative of groundwater in the formation.

APPENDIX C

Site Specific Health and Safety Plan

December 13, 2017

SITE-SPECIFIC HEALTH AND SAFETY PLAN

1221 Spofford Avenue
Tax Lots 35 of Tax Block 2738
Bronx, New York

Prepared for

THE PENINSULA JV, LLC
111 8th Avenue
New York, New York 10011

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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List Job Safety Analyses Forms which are required for the project and are included in Appendix A below:

1. Job Safety Analysis Form
2. Site Walk and Inspection
3. Mobilization and Demobilization
4. Pre-Clearing
5. Sonic Drilling
6. Soil Sampling
7. Drum Handling
8. Well Development
9. Soil Vapor Sampling
10. Groundwater Sampling

1.0 INTRODUCTION

This site-specific Health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 Occupational Safety and Health Act (OSHA) Hazardous Waste Operations and Roux Associates, Inc. (Roux Associates) Standard Operating Procedures (SOPs). It addresses all the activities described below that are associated with the property located at 1221 Spofford Avenue in the Borough of Bronx, City, and State of New York (the Site, Figure 1) and will be implemented by the designated Site Health and Safety Officer (SHSO) during Site work.

When activities are to be conducted, which are not specifically addressed by this HASP, appropriate SOPs and Job Safety Analyses (JSAs) will be reviewed to determine the appropriate work approach and associated levels of health and safety required. If a JSA for the specific activity does not exist, one will be prepared by the field work team, reviewed for completeness by the Project Manager, and implemented as required by the JSA (see Section 6.3 and Appendix A).

Compliance with this HASP is required for all Roux Associates personnel and subcontractors contracted directly by Roux Associates. Assistance in implementing this HASP can be obtained from the Roux Associates Office Health and Safety Manager (OHSM). The content of this HASP may undergo revision based upon additional information made available. Any changes proposed to this HASP must be reviewed and approved by the OHSM or his/her designee [and the Client contact, if applicable].

All Site operations are under the direction of The Peninsula JV, LLC (Client) and any operations or activities covered under this safety plan, which are also addressed by the Client's procedures and protocols will be performed in compliance with their requirements. Specifically, routine operations or activities performed at the Site that commonly require adherence to Clients procedures and protocols include confined space entry, welding, other "hot work" operations, lock-out/tag-out and the use of personal protective equipment/clothing. These requirements were incorporated into Section 8.2 of this HASP and, at a minimum, include the use of high visibility clothing, hardhats, steel toe boots/shoes, work gloves, and safety glasses.

Prior to performing work each task should be evaluated to determine the appropriate procedures that need to be followed.

Responsibility	Name	Telephone Number
Roux Associates Contacts		
Project Principal	Frank Cherena	631-232-2600
Project Manager	Jeffrey Wills	631-232-2600
Site Health and Safety Officer	TBD	
Client Contacts		
Client Contact	Arianna Sacks Rosenberg	

Scope of Work:

The scope of work will vary depending on the tasks planned for each geographic area of the Site (Figure 2). In general, the tasks will include the following:

- Investigation of soil, ground-water quality, and soil vapor quality to develop data on environmental conditions;
- Implementation of remedial measures to recover free product and remediate contaminated soil, ground water and surface water (installation and operation of remedial equipment including product, ground water, and soil vapor recovery equipment); and
- Oversight of excavation activities and other facility construction and demolition activities.

Detailed scopes of work for these activities will be prepared prior to implementation of the tasks.

Emergency Information

Multiple emergency services may be obtained by calling 911. More specific numbers for local services are listed below but should not be used until after 911 is alerted.

Type	Name	Telephone Numbers
Police	NYPD	911
Fire	FDNY	911
Urgent Care Facility (map attached)	City MD	(212) 913-0820
Hospital (map attached)	Bronx Lebanon Hospital	(718) 860-6169

Environmental Emergency

(e.g., release or spill)

Type	Name	Telephone Numbers
Corporate Health and Safety Manager	Joseph Gentile	(856) 832-3768 (Office) (610) 844-6911 (Cell)
Office Health and Safety Manager	Brian Hobbs	(631) 232-2600 (Office) (631) 807-0193 (Cell)
Project Manager	Jeffrey Wills	(516) 637-0213 (Cell)
Project Principal	Frank Cherena	(631) 445-0357 (Cell)

2.0 PERSONNEL DESIGNATIONS

Project Manager

The Project Manager (PM) is responsible for coordination of subcontractors and tasks related to accomplishment of the scope of work. The PM for this project is Wendy Shen.

Site Manager

The Site Manager (SM) is responsible for committing to a goal of ZERO environmental, health and safety incidents. The SM is also responsible for making certain that personnel receive and are aware of the provisions of this HASP, are instructed in the work practices necessary to ensure safety and are familiar with planned procedures for dealing with emergencies. The SM assures that personnel are aware of the potential hazards associated with site operations and correcting any work practices or conditions that may result in injury or exposure to hazardous substances. The SM ensures that at least one person on site, prior to assignment, is trained and certified by the American Red Cross or equivalent and is responsible for rendering first aid. These individuals will be identified by job function and will be recertified per the certifying agency's time schedule. Blood borne Pathogens training will be conducted concurrently and will be provided annually. Potential exposure to blood borne pathogens will be determined without regard for personal protective equipment. When rendering first aid or CPR universal precautions will be observed. Labels and signs will be used to serve as warnings of infectious materials. Employees will also have a copy of the site-specific exposure control plan. The use of PPE/PPC provides for work practice controls. This PPE/PPC will be provided at no cost to employees. Where PPE is provided to minimize exposure to lead, gloves, hats, vented goggles, shoes, or disposable shoe covers are provided. Protective clothing shall be in clean and dry condition at least weekly. Protective clothing shall be cleaned, laundered, properly disposed, and repaired or replaced as necessary. Any blood-soaked bandages, etc., will be placed in leak proof bags for handling, storage, and transport. After contact with blood or other potentially infectious material, all equipment and surfaces shall be cleaned and decontaminated. Hepatitis B vaccine is made available to all employees that have occupational exposure to BBP at no cost. The SM assures that all field personnel are in compliance with the hazardous waste worker health and safety training and medical surveillance requirements of 29 CFR 1910.120 and all other applicable regulations. The SM for this project is yet to be determined.

Corporate Health and Safety Manager

The Corporate Health and Safety Manager (CHSM) is responsible for assuring that the appropriate monitoring and safety equipment and other resources necessary to perform Site activities safely are addressed in the HASP. The CHSM provides consultation to Site personnel on all questions related to health and safety. The CHSM also provides HAZWOPER training based on his extensive industrial experience and technical background (i.e., CIH). The CHSM for Roux Associates is Mr. Joseph Gentile.

Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) will be present onsite during the conduct of all field operations, will be responsible for all health and safety activities, and has the authority to make all health and safety related decisions. The SHSO ensures that all personnel working onsite are qualified according to applicable Environmental Protection Agency, Occupational Safety and Health Association (OSHA) and state requirements. The determination of hazard concentrations will be made by the SHSO in consultation with the CHSM. The SHSO has stop-work authorization which he or she will execute upon determination of an imminent safety hazard, emergency situations, or other potentially dangerous situation, such as detrimental weather conditions. Authorization to proceed with work will be issued by the SHSO or CHSM in consultation with the SM after such action. The SHSO or SM will initiate and execute all contact with emergency facilities and personnel when this action is appropriate. The SHSO will also monitor decontamination procedures to determine their effectiveness. When such procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies. The SHSO for this site is yet to be determined. An assistant SHSO may be designated by the SHSO if required but must be pre-qualified and approved by the CHSM.

Office Health and Safety Manager

The New York Office Health and Safety Manager (OHSM) is responsible for providing support, as needed, to the Project and serves as back-up to the Site Health and Safety Officer. The OHSM assures that field personnel assigned to the project receive a health and safety orientation and are provided with the necessary personal protective equipment and clothing. The OHSM may periodically perform field audits, participate in field assessments, and prepare information to be used for safety communication. The OHSM for this project is Brian Hobbs.

Project Personnel

Project personnel will be responsible for: complying with this HASP; taking all reasonable precautions to prevent injury to themselves and to their fellow employees; performing only those tasks that they believe they can do safely; immediately reporting any accidents and/or unsafe conditions to the SHSO; notifying the SM and the SHSO of any special medical problems (e.g., allergies) and making certain that all on-site personnel are aware of any such problems.

3.0 SITE HISTORY AND PHYSICAL DESCRIPTION

This section provides a brief summary of the history and physical description of the Site.

The Site is located in the Borough of Bronx, City and State of New York and is identified as Tax Lot 35, of Tax Block 2738 on the New York City Tax Map. Figure 1 is a Site Location Map and Figure 2 is a Site Plan. The Site is approximately 165,528-square feet (3.8 acres) and is bordered to the south by mixed use multi-family residential properties and commercial properties. The Corpus Christi Monastery is located to the north of the Site. Multi/single-family residential properties and commercial properties are located west of the Site. Single-family residential properties are located to the east of the Site.

The Site consists of the following buildings and improvements:

Block 2738

Contains a three to six-story building, asphalt paved parking, and recreation/playground spaces such as tennis and basketball courts.

4.0 SITE-RELATED INCIDENTS, COMPLAINTS AND ACTIONS

Historical evidence supporting the potential occurrence of releases exists in two forms, those supported by documentation, and those based on the knowledge of Client personnel. These incidents are presented below by geographical area with documented information first, then "knowledge" information procured from Client personnel. Locations of the tanks, buildings, and Site features mentioned in this HASP are shown on maps maintained in on-site files.

A Phase I Environmental Site Assessment completed in 2017 identified the following recognized environmental concerns (RECs):

1. Reported Spill Incidents: New York State Department of Conservation (NYSDEC) Spill Numbers 9610764, 9901578 and 0812579 were assigned the Site (specifically Lot 35). Spill #9610764 was assigned for a release of 40 gallons of #6 fuel oil due a faulty gauge; and was closed on the same day it was assigned. NYSDEC Spill #9901578 was assigned for discovery of contaminated soil during a subsurface investigation; and was closed on April 6, 2017. Spill # 0812579 was assigned for the release of approximately 2,000 gallons of #2 fuel oil from the underground storage tanks (USTs) located in the southeast courtyard of Lot 35. Several investigations have been performed confirming subsurface soil and groundwater impacts. Also, there is the potential for soil vapor migration and intrusion into the Site buildings, due to the extent of the release. A product recovery program consisting of monthly product recovery and quarterly groundwater monitoring was performed until approximately October 2016. However, no additional information regarding remedial activities since that time have been provided. Therefore, it is assumed separate phase petroleum product and extensive soil contamination still exists at the Site. The impacts to soil, groundwater and, potentially soil vapor, beneath the Site is considered a REC in relation to the Site.

2. Petroleum Use and Storage: Two 12,000-gallon #2 fuel oil USTs are registered as in-service at the site under NYSDEC Petroleum Bulk Storage (PBS) #2-604085; and are located in the in the southeast courtyard of Lot 35. In addition, one 5,000-gallon diesel aboveground storage tank (AST), located in a vault adjacent to the 12,000-gallon USTs, was utilized for a back-up generator was closed-in-place. The location of two additional tanks (one 20,000 gallon #6 fuel oil UST; and one 20,000-gallon AST were, reportedly, closed-in-place. However, the actual locations of these two tanks are not known. Petroleum use and storage at the Site, including the unknown locations of two tanks, is considered a REC in relation to the Site.

3. Staining: Staining observed on the concrete basement floor was presumably associated with oil spills and cleanup materials, and other universal wastes (such as batteries or degreasers, electrical equipment, and lubricating oils). Staining on the concrete basement floor; and is considered a REC in relation to the Site given the presence of floor drains and other penetrations in the concrete.

4. Surrounding Property Use: According to the resources utilized in this Phase I ESA, garages utilizing USTs as well as metal works/fabrication and automobile repair facilities were noted in the surrounding area of the Site. USTs have the potential to release petroleum products to the environment and metal works/fabrication and automobile repair facilities have the potential for using solvents and petroleum products. Therefore, these surrounding properties are, collectively, considered a REC in relation to the Site.

5.0 HAZARD ASSESSMENT

The potential to encounter chemical hazards is dependent upon the work activity performed (intrusive versus non-intrusive) and the duration and location of the work activity. Such hazards could include inhalation and/or skin contact with chemicals/gases that could cause: dermatitis, skin burns, being overcome by vapors or asphyxiation.

Physical hazards that may be encountered during Site work include heat and cold stress, being crushed, head injuries, punctures, cuts, falls, electrocution, bruises and other physical hazards due to motor vehicle operation, equipment use and power tools

Biological hazards may exist during Site activities. These hazards include exposure to insect bites/stings, animals and animal wastes, mold and bloodborne pathogens.

Prior to the beginning of each new phase of work, a job safety analysis (JSA) (Appendix A) will be prepared by the SSO with assistance from the OHSM. The analysis will address the hazards for each activity performed in the phase and will present the procedures and safeguards necessary to eliminate the hazards or reduce the risk. JSAs for each task will be reviewed with onsite personnel at each morning tailgate meeting and as tasks change throughout the day.

5.1 Chemical Hazards

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Installation and sampling of soil borings, and
- Installation, gauging, bailing/purging, and sampling of monitoring wells.

For chronic and acute toxicity data, refer to Summary of Toxicological Data Sheets in Table 1 for further details on compound characteristics.

5.1.1 Carbon Monoxide Hazards

Carbon monoxide (CO) is a colorless, odorless, and toxic gas, which is predominately produced by incomplete combustion of carbon-containing materials. Incomplete combustion occurs when insufficient oxygen is used in the fuel (hydrocarbon) burning process. Common sources of CO

may include: motor vehicle exhausts, fuel burning[1], furnaces, coal burning power plants, small gasoline engines including electric generators, demolition equipment, chain saws, lawn mowers and power washers, marine engines, fuel powered forklifts, propane or kerosene-powered heaters, and fuel burning water heaters.

Exposure to CO impedes the blood's ability to carry oxygen to body tissues and vital organs. When CO is inhaled, it combines with hemoglobin (an iron-protein component of red blood cells), producing carboxyhemoglobin, which greatly diminishes hemoglobin's oxygen-carrying capacity. **Hemoglobin's binding affinity for CO is 300 times greater than its affinity for oxygen.** As a result, small amounts of CO can dramatically reduce hemoglobin's ability to transport oxygen.

Common symptoms of CO exposure are headache, nausea, rapid breathing (i.e., shortness of breath), weakness, exhaustion, dizziness, and confusion (i.e., light headedness). Hypoxia (severe oxygen deficiency) due to acute CO poisoning may result in reversible neurological effects, or it may result in long-term (and possibly delayed) irreversible neurological (brain damage) or cardiological (heart damage) effects.

CO exposure can be dangerous during pregnancy for both the mother and the developing fetus. Please contact CDC-INFO (800-232-4636) if you have any questions regarding CO exposure during pregnancy.

At work sites where carbon-containing fuels are used, such as in internal combustion engines and generators, the exhausts from these units can contain significant concentrations of CO. In situations where the exhausts create exposure to CO, the exhausts of these units should be extended via appropriate hoses/piping to well ventilated exterior areas (i.e., outside and downwind of structures). Where the concentrations of CO exceed the following "action levels," notify the Project Manager and immediately implement the corresponding actions to mitigate exposure.

1 Fuel burning may include natural gas, propane, fuel oil, kerosene, gasoline, coal, or other carbon-based items.

Action Levels Table (CO)

Carbon Monoxide (CO) Action Levels[2]	
Concentration of CO in air	**Action**
< 25 ppm	Inspect exhaust system for leaks or other sources of CO. Monitor initially and every 15 minutes during use of CO-generating equipment.
25 – 50 ppm	Ventilate area. Monitor continuously and record measurements. Contact PM.
> 50 ppm	Stop work activities. Ventilate area.

5.2 Physical Hazards

A variety of physical hazards may be present during Site activities. These hazards are similar to those associated with any construction-type project. These physical hazards are due to motor vehicle and heavy equipment operation and hazardous walking and working surfaces. In particular, when entering or exiting a bermed area surrounding a storage tank, use the stairways provided. Do not enter or exit the bermed area by walking on the bermed surface itself. A hard hat must be worn at all times while working at the base of the cliffs. Additionally, when performing activities at the Site, a hard hat and reflective vest must be worn at all times. Workers must also be aware of electrical hazards, such as overhead power lines, while performing their assigned tasks. These hazards are not unique and are generally familiar to most field personnel. These will be addressed in accordance with Roux's Lock, Tag, and Try Program. Additional task-specific requirements may be covered during safety briefings.

5.2.1 Flammability/Explosive Hazards

A variety of highly flammable/explosive materials may be stored at the Site. Prior to performing activities near potentially flammable/explosive materials (i.e., within storage tank bermed areas), all applicable sections of this HASP and any Client procedures specific to these areas need to be thoroughly understood and adhered to. Any questions or concerns should be directed to the SHSO or the Client's Project Engineer.

2 Based upon The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 25 ppm as an 8-hour time-weighted average (TWA) [ACGIH 2014 TLVs® and BEIs®] and OSHA's Permissible Exposure Limit (PEL) of 50 ppm as an 8-hour TWA concentration [29 CFR Table Z-1].

5.3 Biological Hazards

Biological hazards include exposure to poison ivy/oak, the possibility of disease carrying insects (i.e., ticks) and a variety of wild animals (i.e., coyotes, raccoons, etc.).

5.3.1 Insect Stings

Stings from insects are often painful, may cause swelling, and can be fatal if a severe allergic reaction, such as anaphylactic shock, occurs. If a sting occurs, the stinger should be scraped out of the skin, opposite of the sting direction. The area should be washed with soap and water, followed by an ice pack. Personnel allergic to bee and/or wasp stings shall alert their PM, SHSO and coworkers immediately, and provide/self-administer medicine and antidotes to treat allergic reactions immediately as prescribed by their personal physician, or if the victim has a history of allergic reaction, he/she should be taken to the designated hospital.

5.3.2 Tick Injury Prevention Program

Ticks may carry Lyme disease, Rocky Mountain spotted fever or other diseases. As such, Roux Associates has instituted a program to prevent tick bites and to provide prompt, adequate and appropriate notifications and treatment in the event of a work-related tick bite. This SOP applies to all Roux Associates employees and their subcontractors and is additionally addressed by applicable JSAs.

5.3.3 Project Planning

Pre-planning is the first step in tick avoidance. Where possible, plan the work to avoid tick-infested areas.

- Avoid brushy, overgrown grassy and wooded habitats, particularly in spring and early summer when nymphal-stage ticks feed.
- Remove leaves, tall grass and brush from areas surrounding work areas (to include residential Sites), thereby reducing tick, deer, and rodent habitat.
- Consider having a licensed applicator apply tick-toxic chemicals (e.g., Damminix, Dursban, Sevin, etc.) to surrounding work or residential areas to suppress the tick population.
- Consider performing work during dormant (sub-freezing) seasons; or not during maximum season (spring and early summer) unless it is not practical or rescheduling may introduce other hazards.

5.3.4 Tick Injury Prevention Measures

Where avoidance of tick habitat or clearing of the area is not possible, follow Roux Associates' Tick Prevention SOP which includes the use of PPE and other measures to avoid tick bites. These include:

- Using Permethrin on clothes to kill ticks on contact;
- Wearing light-colored clothing so that ticks can be more easily seen and removed before attachment occurs;
- Wearing long-sleeved shirts and tucking in (or taping) pant legs into socks or boots to prevent ticks from reaching the skin;
- Wearing high boots or closed shoes that cover the entire foot;
- Wearing a hat; and
- Spraying insect repellents containing n,n-diethylm-toluamide (DEET) on exposed skin, excluding the face, in accordance with United States Environmental Protection Agency (USEPA) guidelines.

Tick prevention measures as described above must be implemented prior to entering a potentially tick-infested area. This usually means that the PPE needs to be in place and properly worn before stepping off of a paved or concrete area onto a grassy or wooded area. Pant legs need to be tucked into socks. Where Tyvek is used, the pant legs need to be taped at the ankles.

Insect repellent should be applied in accordance with the manufacturer's instructions. In the event of sensitive ecosystems ensure that the application does not need to be applied at a certain distance from the habitat.

The PPE needs to remain on with the tucking or taping of pant legs, all closures fastened, etc., until leaving the potentially tick-infested area. Upon leaving the area, remove the PPE and bag it to prevent ticks from traveling and subsequently attaching themselves to your skin.

Workers are to inspect themselves and co-workers frequently to see if any ticks are on their clothing and remove them as soon as they are identified. If an embedded tick is found, it should be promptly removed with tweezers. This should be done by grasping the tick firmly and as close to the skin as possible. Then, with a steady motion, pull the tick's body away from the skin.

Cleanse the area with an antiseptic. DO NOT use petroleum jelly, a hot match, nail polish or other products to remove the tick. **Preserve the tick for analysis (i.e., by placing in a zip lock bag, envelope, or jar). The tick will be analyzed to determine if it contains the bacteria capable of causing Lyme disease.** After returning home, it is also important to do another thorough examination while showering as a further check that no ticks were missed in previous inspections. Also, it is recommended that any work clothes be washed and dried at high temperatures.

5.3.5 Responding to Known or Suspected Tick Bites

Any discovery of a tick embedded in the skin where the tick contact may have occurred at work will require (in addition to project management) immediate contact of the Office Manager, OHSM, and CHSM.

Medical practitioners consulted by Roux Associates recommend not administering an antibiotic until AFTER symptoms such as rash, flu-like symptoms, fever, joint or muscle aches, nausea or vomiting develop which could take a few days. Therefore, for tick bites determined to be work related, **antibiotics should not be prescribed or administered until AFTER the results of the tick testing are reviewed and until after any characteristic symptoms develop.**

5.3.6 Tick Incident Investigation and Reporting

Investigation and reporting of a work-related tick bite will follow established incident investigation and reporting procedures. The Roux Associates Health and Safety Lessons Learned (H&SLL) / Accident Report Forms (ARF) will be used for documenting incidents as appropriate, and are provided in Appendix C.

5.3.7 Animals and Animal Wastes

There is potential for various wildlife to reside within the structures, including, but not limited to pigeons, bats, mice, rats, squirrels, raccoons, stray dogs, and feral cats. Certain animals can represent significant sources (vectors) of disease transmission. Precautions to avoid or minimize potential contact with (biting) animals (such as some of the above listed) or animal waste and/or dead animals should be considered prior to all field activities. Rats, squirrels, raccoons, feral cats, and other wild animals can inflict painful bites which can also cause disease (as in the case of rabid animals). Site personnel should avoid contact with any of the above.

If contact occurs, be sure to clean the area thoroughly with soap and water as soon as possible. If a bite occurs, the area should be cleaned thoroughly immediately with soap and water and medical attention should be sought.

5.3.8 Blood-Borne Pathogens

The majority of the occupational tasks on-Site will not involve a significant risk of exposure to blood, blood components, or body fluids. The highest risk of acquiring any blood borne pathogen for employees on-Site will be following an injury. When administering first aid care, there are potential hazards associated with blood borne pathogens that cause diseases such as Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Hepatitis A (HAV), Hepatitis C (HCV), or the Herpes Simplex Virus (HSV). An employee who has not received the appropriate certification and blood borne pathogens training should never perform first aid and/or cardiopulmonary resuscitation (CPR).

In order to minimize any potential pathogen exposure, all employees should use the hand washing facilities on a regular basis. The decontamination area will provide an adequate supply of water, soap, and single use towels for hand washing. Additionally, the following universal precautions should be followed to prevent further potential risk:

- Direct skin or mucous membrane contact with blood should be avoided.
- Open skin cuts or sores should be covered to prevent contamination from infectious agents.
- Body parts should be washed immediately after contact with blood or body fluids that might contain blood, even when gloves or other barriers have been used.
- Gloves and disposable materials used to clean spilled blood shall be properly disposed of in an approved hazardous waste container.
- First aid responders shall wear latex or thin mil nitrile gloves when performing any procedure risking contact with blood or body substances.
- Safety glasses will be worn to protect the eyes from splashing or aerosolization of body fluids.
- A CPR mask will be worn when performing CPR to avoid mouth-to-mouth contact.
- Cut-resistant work gloves will be worn to minimize the risk of injury to the hands and finger when working on all equipment with sharp or rough edges.
- Broken glass or possible contaminated material shall be avoided with unprotected hands.

5.3.9 Mold

A collection of moisture inside on-Site structures may lead to the growth of mold within the structures.

Although mold affects individuals differently and to different degrees, the following are some of the most common adverse health effects:

- Respiratory problems – wheezing, difficulty breathing;
- Nasal and sinus congestion;
- Eyes – burning, watery, reddened, blurry vision, light sensitivity;
- Dry, hacking cough;
- Sore throat;
- Nose and throat irritation;
- Shortness of breath and lung disease;
- Chronic fatigue;
- Skin irritation;
- Central nervous system (headaches, loss of memory, and mood changes);
- Aches and pains;
- Fever;
- Headaches;
- Diarrhea; and
- Immune suppression.

Decisions about removing individuals from an affected area must be based on the results of a medical evaluation, and be made on a case-by-case basis.

Workers that discover the visible presence of mold in excess of ten square feet need to notify the SHSO for consultation. If a worker smells mold and feels that he/she is experiencing symptoms of exposure, he/she should retreat and report the symptoms to the SHSO.

5.3.10 Other Biohazards

Other biological hazards include mosquitoes which generally live in the vicinity of brush, trees, and stagnant water. Some areas have mosquitoes that carry viruses (for example, West Nile virus, or Eastern Equine Encephalitis). Another category of biohazards includes plants such poison ivy, poison oak, and poison sumac. If exposed to these plants, personnel will wash skin thoroughly with soap and water or post-contact cleansers.

5.4 Heat/Cold Stress

Heat and cold stress are potential hazards associated with heavy physical activity and/or the use of personal protective equipment in hot or cold weather environments. Heat and Cold stress are discussed in Sections 9.13 and 9.14. Protection against sun exposure by wearing a sun screen, hat, and long-sleeved shirts must be implemented when warranted in addition to frequent and proactive hydration of workers.

5.5 Noise

Noise is associated with the operation of heavy equipment, power tools, pumps, and generators. Personnel with 8-hour time weighted average (TWA) exposures exceeding 85 decibels (dB) must be included in a hearing conservation program in accordance with 29 CFR 1910.95. High noise operations will be evaluated by the SHSO. Noise exposure will be controlled through the use of hearing protection such as ear plugs or ear muffs or by maintaining set-backs from high-noise equipment as warranted.

5.6 Hazards Caused by Roux's Work

Roux Associates will advise the Client of any unique hazards presented by its work or of any hazards found by Roux during the course of its work for the Client.

- Heavy equipment and motor vehicle traffic- Workers shall wear fluorescent, reflective Class 3 vests or high visibility outerwear in high traffic areas and utilize traffic cones, barricades, and caution tape to protect work areas, as necessary;
- Slip, trip, fall hazards associated with uneven terrain, obstacles, and slippery or icy surfaces- General housekeeping will be performed to reduce slip, trip and fall hazards;
- Sharp edges, broken glass, exposed nails, rusty metal (wear leather or ANSI Level 2 cut-resistant gloves);
- Pinch points (wear leather or ANSI Level 2 cut-resistant gloves);

- Overhead hazards (wear hard hats as applicable); and
- Flying objects and airborne particulate hazards (Wear safety glasses, goggles, or face shields when appropriate).

5.7 Electrical Hazards

Portable pumps, generators, and other power tools require proper grounding and/or a ground fault circuit interrupter (GFCI) before operation. Personnel should never attempt to move an operating pump or generator.

6.0 TRAINING REQUIREMENTS

6.1 Basic Training

All site personnel who will perform work in areas where there exists the potential for toxic exposure will be health and safety trained prior to performing work onsite per OSHA (29 CFR 1920.120(e)). Initial and annual training will include the locations of and proper use of safety equipment such as portable fire extinguishers. American Red Cross basic first aid and adult CPR will be offered to employees approximately every two years. Training records will be maintained by the SHSO onsite and as described in Section 6.4. OSHA HAZWOPER training will be provided annually and is limited to first responder awareness level only. Where training is required by a specific health or safety standard, this will be conducted initially and annually and will include the information summarized in the Toxicological Table, Table 1 of this HASP.

6.2 Site-Specific Training

Training will be provided by the SHSO and SM that specifically addresses the activities, procedures, monitoring and equipment to be utilized by site personnel and visitors. The training will include site and facility layout, hazards, emergency services at the site, and will detail all provisions contained within this HASP. Site-specific training will be documented and kept as part of the project records.

6.3 Safety Briefings

Project personnel will be given briefings by the SHSO, the PM and/or the Client's Project Engineer on an as-needed basis to further assist them in conducting their activities safely. Safety briefings will be provided each morning and when new operations are to be conducted; changes in work practices must be implemented due to new information made available and before work is begun at each onsite work area. Safety briefings will include a discussion of anticipated hazards, review Job Safety Analyses for tasks to be implemented, pertinent Loss, Lessons Learned, Peer Observation finding, and safety violations. These include not following Client rules or procedures, not following established safe work practices, and lack or improper use of personal protective equipment/clothing, etc. On-site safety briefings will be documented daily on the forms included as Appendix D (Health and Safety Briefing/Meeting Log and Daily Site Safety Checklist), and will be kept by the SHSO as part of the project records. In addition, when activities are to be conducted which are not specifically addressed by this HASP, appropriate JSAs

will be reviewed to determine the appropriate levels of health and safety required. If a JSA for the specific activity does not exist, one will be prepared by the field work team, reviewed for completeness by the Project Manager, and implemented as required by the work scope. Copies of the completed JSA forms for various tasks are included in Appendix A. Modifications to JSAs will be documented on these forms and maintained in the project file. Observed safety violations will be addressed by coaching and mentoring of personnel.

6.4 Record Keeping Requirements

All record keeping requirements mandated by OSHA (29 CFR 1910.120) will be strictly followed. Specifically, all current personnel training records, medical fit for duty papers, and respirator fit test forms will be required before work can begin and maintained onsite during the length of the project. These records along with injury/incident reports, medical examination records and exposure monitoring records will become a permanent part of the project records. Each subcontractor will maintain the above-mentioned records for his employees.

Medical and exposure records maintained per 29 CFR 1910.1020 will be maintained for at least the duration of employment plus 30 years. Training records will be maintained for 3 years from the date of training.

Medical and exposure records shall be made available upon request to employees, and to the Assistant Secretary or the Director (OSHA) for examination and copying. Medical records must have written consent of employee before being released. Transfer of records will be in compliance with 29 CFR 1910.1020 (h).

7.0 ZONES, PROTECTION, AND COMMUNICATIONS

7.1 Site Zones

A three-zone approach to site operations to control the potential spread of contamination will be employed. The three zones are:

- The Exclusion Zone;
- The Contamination Reduction Zone; and
- The Support Zone.

The establishment of work zones will ensure that: personnel are properly protected against the potential hazards in the area where they are working; work activities and potential contamination are limited to the specific areas; and personnel can be easily located and evacuated in an emergency.

The establishment of work zones and the levels of protection required within the zones will be determined on a case-by-case basis. The SHSO, PM and the Client's Project Engineer will determine the need for work zones, and based upon Site-specific knowledge and data, determine the levels of protection within the established zones. The following sections provide general specifications for the three work zones.

7.1.1 Exclusion Zone

The area(s) which contain, or are suspected to contain, hazardous materials or activities will be considered the Exclusion Zone (EZ). The SHSO may establish more than one restricted area within the EZ when different levels of protection may be employed or different hazards exist. Signs will be posted in and around areas required to be posted by a specific health or safety standard. No personnel are allowed in the EZ without:

- The proper personal protective equipment;
- Medical authorization per Section 8.4;
- A need to be in the zone; and
- Training certification.

During excavation, drilling and sampling activities, the Exclusion Zone is defined as the excavation and a 10-foot radius around the excavation boundary, or drilling or sampling locations.

For the purposes of this project, the Exclusion Zone(s) will be delineated once the work sites have been determined.

7.1.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) will be established between the Exclusion Zone and the Support Zone. The CRZ will contain the contamination reduction corridor (CRC) and is designed to reduce the probability that the uncontaminated clean areas will become contaminated or affected by other site hazards. It is the area where decontamination of personnel and equipment takes place and serves to limit the physical transfer of hazardous substances into clean areas. Decontamination shall be performed in geographical areas that minimize the exposure of uncontaminated employees or equipment to contaminated employees or equipment. The CRZ is to be used for general site entry and egress including access for heavy equipment for investigation activities. The CRZ will also contain safety and emergency equipment (see Section 7.2.3). No personnel are allowed in the CRZ without:

- The proper personal protective equipment;
- Medical authorization per Section 8.4;
- A need to be in the zone; and
- Training certification.

7.1.3 Support Zone

The Support Zone (SZ) is considered the uncontaminated area and will be separated from the CRZ by the "Contamination Control Line". The SZ will contain the support facility that will provide for team communications and emergency response. Appropriate sanitary facilities and safety and support equipment will be located in this zone. The majority of site operations as well as site access of authorized persons will be controlled from this location. The support facility will be located up-wind of site operations, if possible, and may be used as a potential evacuation point. No potentially contaminated personnel or materials are allowed in this zone.

7.1.4 Buddy System

Select field activities conducted in contaminated, hazardous, and remote areas of the Site may require the use of the buddy system. Instances when the buddy system should be employed

include, but are not limited to activities performed in wetland areas (i.e., surface-water sampling, etc.), excavation activities, drilling activities and confined space entry (permit required and non-permit required). Prior to commencing with field tasks in a potentially hazardous area, the need for using the buddy system should be evaluated. If required, a buddy should be able to:

- Provide his/her partner with assistance;
- Observe his/her partner for signs of chemical or heat/cold exposure;
- Periodically check the integrity of his/her partner's protective clothing; and
- Notify the SHSO or others if emergency help is needed.

7.2 Personal Protection

This section describes the levels of protection that will be required by on-site personnel during Site activities.

7.2.1 General

The level of protection to be worn by field personnel and visitors will be defined and controlled by the SHSO, the PM and the Client's Project Engineer. Where more than one hazard is indicated, further definition shall be provided by review of Site hazards, conditions, and operational requirements and by monitoring at the particular operation being conducted.

Intrusive activities (i.e., drilling, excavation activities, etc.) include any Site activity which will, or potentially will, result in exposure(s) to hazardous or toxic chemicals or physical agents at or above the permissible exposure limit (PEL), or to flammable or oxygen-deficient atmospheres. Prior to commencing with any field activity, the potential for such conditions should be evaluated to determine air monitoring requirements. General procedures for air monitoring are described below.

During intrusive activities, continuous monitoring will be performed using the photoionization detector (PID). If personal monitoring is needed, it will only be undertaken under the direction and direct supervision of the CHSM.

Based upon the results of air measurements of intrusive activities in these worst case areas, the level of personnel protection will be established for the remainder of the Site. Protection may be

upgraded or downgraded by the SHSO in conjunction with the PM based upon the PID instrument.

All non-intrusive activities that preclude contact with contaminated media will be performed in Level D protection without continuous monitoring, unless periodic PID monitoring indicates additional monitoring is warranted. However, initial monitoring may be necessary utilizing the PID.

7.2.2 Respiratory Protection and Clothing

Three levels of protective equipment are discussed below including Level D, Level C, and Level B.

Level D Protection

1. Personal Protective Equipment:
   - High visibility/reflective coveralls/clothing
   - Cut Resistant gloves (or leather work gloves);
   - Boots/shoes, leather, or chemical-resistant, steel toe and shank;
   - Ice cleats(1);
   - Boots (outer), chemical-resistant (disposable)*;
   - Chemical resistant gloves – nitriles*;
   - Chemical resistant clothing (e.g., Tyveks)*;
   - Fire Retardant Clothing(2)*
   - Safety glasses or chemical splash goggles(3);
   - Hard hat; and
   - Hearing protection.

   * Optional for activities except when handling petroleum product (i.e., well bailing) and materials (i.e., soil, sorbent products, etc.) exhibiting high degrees of petroleum contamination

   (1) Ice Cleats to be worn with approved safety shoes when working in areas with snow/ice cover.

   (2) Fire retardant coveralls required in areas of hot work/areas with potential for flash (i.e., truck flammable loading rack, within tank berms).

(3) Clear lenses to be worn when working in low light areas inside site buildings and outside during overcast days that may limit visibility.

2. Criteria for Selection.
   - Non-intrusive activities and intrusive activities in areas where the potential airborne hazards are substantially characterized and do not pose a threat of exposure in excess of one-half the PEL.
   - PID instrument (such as the MiniRAE 3000 or other comparable instrument) readings in the breathing zone are less than 5 ppm. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.
3. Modifications of Level D will be used to increase or decrease the level of skin protection during activities that increase or preclude, respectively, the degree of contact with chemical hazards. Modifications for increased protection may include the use of chemical resistant coveralls (e.g., Tyveks) and chemical resistant gloves. Chemical resistant coveralls, gloves, and boots will be used when the handling of petroleum products is required (i.e., well bailing). Any modifications of Level D will require approval of the SHSO and PM.

Protection may be upgraded or downgraded by the SHSO in conjunction with the Project Principal on the basis of action levels presented below:

Action Levels for Respiratory Protection (Total Organic Vapors)

Total Organic Vapors in Breathing Zone (ppm)(1)	Action
≤ 5	No Action
> 5 – < 25	Cease Field Operations
≥ 25	Cease Field Operations

(1) Based on relative response (sensitivity of PID to total organic vapors).

PID Action Levels

If photoionization detector measurements are above 5 ppm-v but below 25 ppm-v above background for five minutes in the breathing zone, employee protection will be upgraded to Level C with the use of a full-face respirator.

If PID measurements exceed 25 ppm-v above background for five minutes in the breathing zone, work activities will cease until airborne vapor levels can be reduced to less than 25 ppm-v and are quantified or the SHSO determines alternate methods to be followed in order to proceed.

Most activities are conducted outdoors, where breathing of high vapor levels are not likely in aboveground areas. Excavations which are not to be entered are likely to have higher vapor concentrations. Where a spill occurs in a basement or other indoor area, ventilation will not be as good as outdoors and extra care shall be taken in monitoring vapor levels.

Action Levels for Oxygen Levels and Combustible Gases

COMBUSTIBLE GASES [1]	
0-2.0 – 2.0% LEL	Continue monitoring
2.0 – 5.0% LEL	Notify SHSO
5.0% LEL or greater	Potential explosion hazard Interrupt task / Evacuate Area
OXYGEN [1]	
20.8% O_2	Oxygen level normal
Greater than 22.0% O_2 / Less than 20.0% O_2	Oxygen enriched / deficient – notify SHSO
Greater than 23.5% O_2 / Less than 19.5% O_2	Oxygen enriched / deficient Interrupt task / Evacuate area

[1] Action levels are based on Environmental Protection Agency Standard Operating Safety Guides; Table 5-1, Atmospheric Hazard Action Guidelines may be further restricted based on the CIH's professional judgment and experience.

Level C Protection

1. Personal Protective Equipment:
   - Full-face, air-purifying, cartridge-equipped respirator (MSHA/NIOSH specifically approved for protection from organic vapors per OSHA 1910.1028);
   - Chemical-resistant clothing (coverall; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls);
   - Gloves (outer), chemical-resistant - nitriles;
   - Gloves (inner), chemical-resistant - latex;
   - Boots (inner), chemical-resistant, steel toe and shank;
   - Boots (outer), chemical-resistant (disposable*);
   - Hard hat;

- Hearing protection; and
- Escape mask*.

* Optional

2. Criteria for Selection.

   Meeting any of these criteria warrants use of Level C protection.

   - Airborne hazards are known to be present but are unlikely to exceed protection factors provided by air-purifying respirators.
   - Continuous total organic vapor readings in the breathing zone register between 5 ppm and 25 ppm on a PID (such as the MiniRAE 3000 or other comparable instrument), benzene and furfural readings utilizing colorimetric indicator tubes (e.g., Dräeger or Sensidyne) are detectable but less than 5 ppm.
   - Measured air concentrations of known organic vapors will be reduced by the respirator to, at, or below one-half the permissible exposure limits, and the individual and combined compound concentrations are within the service limit of the respirator cartridge.
   - Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life and Health (IDLH) concentrations.
   - Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.
   - Job functions have been determined not to require self-contained breathing apparatus.

Notes: 1. Benzene and furfural may also be monitored initially and periodically in the breathing zone utilizing activated charcoal sampling devices.

2. Modifications of Level C will be used to increase or decrease the level of skin protection during activities that increase or preclude, respectively, the degree of contact with chemical hazards. Modifications for increased protection may include the use of chemical resistant coveralls (e.g., Tyveks) and chemical resistant gloves. Any modifications to Level C will require approval of the SHSO and PM.

Level B Protection

1. Personal Protection Equipment:
   - Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved);
   - Chemical-resistant clothing (overall and long-sleeved jacket; coveralls; hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls);
   - Gloves (outer), chemical-resistant;

- Gloves (inner), chemical-resistant;
- Boots (inner), chemical-resistant, steel toe and shank;
- Boots (outer), chemical-resistant, (disposable);
- Hard hat;
- Hearing protection; and
- Two-way radio communications (intrinsically safe).

2. Criteria for Selection

   Meeting any one of these criteria warrants use of Level B protection:

   - PID instrument (such as the MiniRAE 3000 or other comparable instrument) readings in the breathing zone are greater than 25 ppm and less than 500 ppm, benzene and furfural are detectable at concentrations at or above 5 ppm utilizing colorimetric indicator tubes (e.g., Dräeger or Sensidyne).
   - Airborne hazards are known to be present, but are not identified or quantified.
   - The type(s) and atmospheric concentration(s) of toxic substance(s) have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:
     - ♦ With IDLH concentrations;
     - ♦ Exceeding limits of protection afforded by a full-face, air-purifying respirator; or
     - ♦ Containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.
   - The atmosphere contains less than 19.5% oxygen.
   - Site operations make it highly unlikely that the small, unprotected arc of the head or neck will be contacted by splashes of extremely hazardous substances.
   - If work is performed in an enclosed space where the exposure to toxics or an oxygen deficient atmosphere may be present.

7.2.3 Safety Equipment

Basic emergency and first aid equipment will be available at the Support Zone and/or the CRZ as appropriate. This shall include first aid kit, emergency eyewash, fire extinguishers, and other safety-related equipment. Basic emergency and first aid equipment is available onsite. Field

personnel will be notified of the locations of emergency and first aid equipment prior to commencing with field activities.

Hand Tools

Where hand and power tools are used and employees are potentially exposed to the hazard of falling, flying, abrasive, or splashing objects, or are exposed to harmful dust, fumes, mists, vapors, or gases, the employees shall be provided the appropriate Personal Protective Equipment as necessary to protect them from the hazard.

Communications

Mobile Telephones – for communication with emergency support services/facilities. All Roux Associates, Inc. site personnel will be equipped with a mobile phone. Mobile communications, however, will be prohibited when the user is within the work area to avoid injuries resulting from distraction.

8.0 MONITORING PROCEDURES FOR SITE OPERATIONS

8.1 Air Quality Monitoring During Site Operations

The SHSO will monitor wind direction and temperature during monitoring and record all data in a log book. All monitoring equipment will be calibrated to the manufacturer's specifications each day prior to use and documented in Site field books.

8.2 Air Quality Monitoring During Intrusive Activities

Intrusive activities include any Site activity which will, or will possibly, result in exposure(s) to hazardous or toxic chemicals or physical agents at or above a permissible exposure limit (PEL), or to flammable or oxygen-deficient atmospheres. Prior to commencing with any field activity, the potential for such conditions should be evaluated to determine air monitoring requirements. General procedures for air monitoring are described below.

Air monitoring will be performed to establish the concentrations of volatile organic compounds during invasive activities using the following instrument(s):

- Photoionization detector;
- Colorimetric indicator tubes (e.g., Dräeger or Sensidyne), if necessary; and
- Activated charcoal sampling devices, if necessary.

The PID will be used to provide direct readings of organic vapor concentrations during intrusive activities to determine that personnel protection is adequate.

A combustible gas LEL/O_2 meter will be used to monitor the potential for oxygen-deficient atmospheres and for explosive concentrations of organic vapors during intrusive operations and any potential confined space work. Monitoring will be performed according to the action levels for oxygen and combustible gases provided in Section 7.2.2.

In accordance with the DER-10 Technical Guidance for Site Investigation and Remediation dated May 2010 (DER-10) issued by the New York State Department of Environmental Conservation (NYSDEC), a community air monitoring plan (CAMP) will be implemented during intrusive Site activities. The Generic CAMP as provided in DER-10, Appendix 1A, is included in Appendix I of this HASP.

8.2.1 Level D Intrusive Activities

Level D intrusive activities will initially include all intrusive Site activities. These investigations/activities will begin utilizing Level D protection as described in Section 7.2.2, with upgrading as necessary to assure adequate personnel protection.

The SHSO will monitor the breathing zone with the PID in continuous operating mode and with the alarm activated. The alarm will be set at 5 ppm, which is below the permissible exposure level (PEL) for all constituents of concern, except benzene and furfural. If the PID indicates the 5-ppm concentration has been exceeded, the SHSO will order cessation of the activity and the exclusion zone cleared of all personnel until the PID indicates a reading less than 5 ppm, or until the nature of the hazard has been more thoroughly evaluated.

8.2.2 Level C Intrusive Activities

Level C intrusive activities will initially include only those activities which require upgrading from Level D. Level C protection will be as described in Section 7.2.2, with upgrading, as necessary, to Level B to assure adequate personnel protection. Downgrading to Level D protection will also be possible if monitoring demonstrates no inhalation hazard exists for the activity.

The SHSO will monitor the breathing zone with the PID in continuous operating mode and with the alarm activated. The alarm will be set at 5 ppm, which is below the permissible exposure level (PEL) for all constituents of concern except benzene and furfural. If the PID indicates the 5-ppm concentration has been exceeded, the SHSO will initiate measurements utilizing the colorimetric indicator tubes for benzene and furfural.

If the PID readings exceed 25 ppm total organic vapor, or the benzene and/or furfural colorimetric indicator tube readings exceed 5 ppm, the SHSO will order cessation of the activity until: 1) the PID indicates a reading less than 25 ppm, and the benzene and/or furfural concentrations are below 5 ppm based upon the colorimetric indicator tube readings, 2) all potentially exposed personnel have donned Level B respiratory protection or, 3) the nature of the hazard has been more thoroughly evaluated and it is determined that the measured concentrations do not pose a potential exposure in excess of the PEL utilizing the Level C protection.

To confirm the adequacy of respiratory protection, personnel monitoring utilizing activated charcoal sampling devices may be performed to measure the airborne concentrations of benzene and furfural and possibly other organic compounds (as necessary) at the beginning of new activities and periodically during intrusive activities. These samples would be sent to an AIHA accredited laboratory for analysis using the approved NIOSH analytical methods.

8.2.3 Level B Intrusive Activities

Level B intrusive activities will initially include only those activities that require upgrading from Level C, and only those activities required to bring work to a safe stoppage. No work is currently planned utilizing Level B protection, and this HASP will require amendment at such time as Level B work becomes necessary (except for safe work stoppage activities).

When Level B protection is utilized, the SHSO will monitor the breathing zone with the PID in continuous operating mode and with the alarm activated. The alarm will be set at 100 ppm. If the PID indicates the 100-ppm concentration is exceeded, the SHSO will order cessation of the activity until: 1) the PID readings are below 100 ppm or; 2) until the nature of the hazard has been more thoroughly evaluated and it is determined that the measured concentrations do not pose a potential exposure in excess of a PEL utilizing the Level B protection.

To confirm the adequacy of respiratory protection, personnel monitoring utilizing activated charcoal sampling devices may be performed to measure the airborne concentrations of benzene and furfural and possibly other organic compounds (as necessary) whenever Level B protection is utilized.

8.3 Air Quality Monitoring During Non-Intrusive Activities

Non-intrusive activities include any Site activity which would not reasonably be expected to result in exposure(s) to hazardous or toxic chemicals or physical agents at or above the permissible exposure limit (PEL), or to flammable or oxygen-deficient atmospheres. Based upon the current understanding of Site conditions no monitoring is required during non0intrusive activities.

8.4 Medical Surveillance Requirements

Medical surveillance specifies any special medical monitoring and examination requirements as well as stipulates that all Roux Associates personnel and subcontractors contracted directly by Roux Associates are required to pass the medical surveillance examination or equivalent for hazardous waste work required by 29 CFR 1910.120.

The examination will be taken annually, at a minimum, and upon termination of employment with the company at no cost to employees. Additional medical testing may be required by the CHSM, or CHSM in consultation with the company physician and the SHSO, if an overt exposure or accident occurs, or if other site conditions warrant further medical surveillance.

Medical examinations and procedures shall be performed by or under the supervision of a licensed physician. Medical surveillance is provided without cost to the employees.

9.0 SAFETY CONSIDERATIONS FOR SITE OPERATIONS

9.1 General

In this section, non-monitoring, safety-related procedures are described. In general, all site activities should be conducted in accordance with the Client's Safe Work Practices Requirements and Contractor Safety Rules and Work Procedures.

9.2 Site Walk-Throughs

Safety considerations during site walk-throughs are important since this activity will usually precede all other field operations. Air monitoring will be performed as indicated in Section 8.0 and will be used to assist in prescribing levels of protection for future site operations, designating site layout and identifying areas of particular hazard, if any.

9.3 Construction Activities

Activities involved with construction of remedial action treatment systems will initially be considered non-intrusive activities. However, initial and/or periodic monitoring, as described in Section 7.2 may be performed by the SHSO.

A variety of physical hazards may be present during any construction-type project. Personnel should be aware of safety issues associated with; noise, cold, hot work such as welding, cutting and burning, heavy lifting, rough terrain, heavy equipment operation, ladders, scaffolding, excavating and trenching, underground and overhead utilities, electrical hazards, and the hazards associated with hand and power tools. These hazards are not unique and are generally familiar to most construction personnel.

9.4 Heavy Equipment and Traffic Safety

The SHSO will be present onsite during all invasive operations and will provide health and safety monitoring to ensure that appropriate levels of protection and safety procedures are utilized.

This Site utilizes all of the mechanical equipment used on any major construction site. Typical machinery to be found includes pumps, compressors, generators, portable lighting systems, pneumatic tools (drum openers), hydraulic drum crushers, pug mills, forklifts, trucks, dozers, and

backhoes, drill rigs. It poses a serious hazard if not operated properly, or if personnel near machinery cannot be seen by equipment operators.

Roux SOP 1.13R1 outlines Roux policies and procedures regarding Heavy Equipment Exclusion Zone (HEEZ) set up and use. The objective of the Exclusion Zone Policy is to establish the minimum clearance distance that must be maintained between workers and heavy equipment while equipment is in operation (i.e., engaged or moving). The intent is to have no personnel or other equipment entering the HEEZ while the equipment is in operation/moving, to ensure that Roux and Subcontractor employees are not unnecessarily exposed to the hazards of the equipment. Appendix E provides Roux Associates' Heavy Equipment Exclusion Zone SOP.

In addition, safety procedures relating to traffic safety must be followed while performing on-site and off-site activities.

On-Site Traffic Safety Procedures

When performing activities on, or adjacent to on-site roads, the following traffic safety procedures must be followed.

- High-visibility coveralls must be worn during Site activities as described in Section 7.2 of this HASP. If possible, the coveralls being worn should be modified via wearing of a reflective vest or with a reflective, reflective stripe(s) when working on, or adjacent to all paved and unpaved roads at the Site.

- When performing activities on, or on the shoulder of any paved roads (e.g., Site entrance and exit roads, the primary roads leading to a truck loading rack, paved areas at a truck loading rack), a minimum of two people must be present. One person will serve as a "traffic watchman" whose sole responsibility is to monitor traffic conditions and alert worker(s) of potential traffic hazards. The "traffic watchman" must be alert at all times and focused on traffic conditions. At no time should the "traffic watchman" engage in activities other than monitoring traffic conditions.

- When performing activities at wells, well vaults, manholes, etc., on, or adjacent to all paved and unpaved roads at the Site, the work vehicle should be positioned, to the fullest extent possible, to form a barrier between the worker(s) and oncoming traffic. In addition, each work vehicle will be equipped with a minimum of four high visibility traffic cones. All traffic cones will be placed as necessary to alert traffic of ongoing activities.

- All Client and Roux Associates subcontractors performing work at the Site must also adhere to the above safety procedures.

Off-Site Traffic Safety Procedures

When performing activities on or adjacent to off-site roads, the following traffic safety procedures must be followed.

- When performing activities on, or adjacent to off-site roads (paved and unpaved), a reflective vest or high visibility outerwear will be worn at all times.
- As described in on-site procedures, when performing activities on, or adjacent to off-site paved roads, a "traffic watchman" must be used at all times.
- As described in on-site procedures, when performing activities on, or adjacent to off-site roads, the work vehicle should be positioned, to the fullest extent possible, to form a barrier between the worker(s) and oncoming traffic. In addition, a minimum of four 42" high traffic cones will be placed as necessary to alert traffic of ongoing activities.

9.4.1 Inspection

Each piece of potentially hazardous equipment (i.e., power tools) will be inspected for proper and safe operation prior to its use.

- All mechanical and rigging equipment will be inspected by the operators prior to beginning this work effort, and at least daily thereafter, to ensure proper operating capability and that all guards are adequate and in place. Defective equipment must be repaired or replaced prior to continued use/operation.
- Inspect all cables, sheaves, slings, chains, hooks, and eyes prior to use.
- Secure equipment firmly or make sure it is supported.
- Be sure all power lines are inactivated, removed, or at a safe distance.
- Always use proper loading for capacity at lifting radius.
- Keep all equipment lubricated and maintained.
- Employ signal persons whenever needed.
- Make certain that signals are understood and observed.

9.5 Drilling Operations

The SHSO will be present onsite during all Roux Associates contracted, and when requested, Client contracted, drilling operations. The SHSO will provide health and safety monitoring to ensure that appropriate levels of protection and safety procedures are utilized. The proximity of chemical, water, sewer, and electrical lines will be identified by the Client's Project Engineer

before any subsurface activity or sampling is attempted. Refer to Appendix F for the Roux Associates' Subsurface Utility Clearance Procedure, which provides guidance regarding the identification of subsurface structures through exploratory test-hole advancement to target depths in order to be protective of underground utilities potentially in the borehole location and the health and safety of both onsite personnel and the public.

Proper stockpiling, containment, and disposal practices will be utilized in regard to the potential amount of waste generated during operations. The location of safety equipment and evacuation procedures will be established prior to initiation of operations according to this HASP. The use of hard hats, eye protection, ear protection, hand protection, and steel-toed boots will be required during all drilling operations.

9.6 Excavation and Backfill Operations

The SHSO will be present onsite during all Roux Associates contracted excavation and backfill operations and will provide health and safety monitoring to ensure that appropriate levels of protection and safety procedures are utilized. The proximity of chemical, water, sewer, and electrical lines will be identified by the Client's Project Engineer before any subsurface activity or sampling is attempted.

The following safe work practices will be followed during this task:

- The proximity of chemical, water, sewer and electrical lines will be identified by a facility representative prior to any subsurface activity beginning.
- Roux's subsurface protocol or the Client's protocol will be used, whichever is more stringent.
- While excavating, stay out of the reach of the backhoe arm's swing by standing at the end of the excavation, not near the sides (sides have the potential to cave in).

Maximum Allowable Slopes

Soil or Rock Type	Maximum Allowable Slopes (H:V)[1] for Excavations less than 20 Feet Deep[3]
Stable Rock	Vertical (90°)
Type A[2]	¾ : 1 (53°)

Maximum Allowable Slopes

Soil or Rock Type	Maximum Allowable Slopes (H:V)[1] for Excavations less than 20 Feet Deep[3]
Type B	1 : 1 (45°)
Type C	1½ : 1 (34°)

OSHA (29 CFR 1926.652, Subpart P, Appendices A and B)

Notes:

[1] Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

[2] A short term maximum allowable slope of 1/2H : 1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H : 1V (53°).

[3] Sloping or benching for excavations greater than 20 feet deep shall be designed by a Registered Professional Engineer.

Proper stockpiling, containment, and disposal practices will be utilized in regard to the potential amount of waste generated during operations. The location of safety equipment and evacuation procedures will be established prior to initiation of operations according to this HASP. The use of hard hats, eye protection, ear protection, hand protection and steel-toed boots will be required during excavation or other heavy equipment operations.

9.7 Overhead/Underground Power Lines

The positioning or operation of heavy equipment in the vicinity of utility services will not be initiated until the activities have been coordinated with the Client's Project Engineer and SM. Operation of equipment adjacent to or under overhead power lines, in such a manner that encroaches on authorized clearances, will not take place unless one of the following are satisfied:

- Power has been shut off and positive steps are taken to prevent the lines from being energized;
- The equipment does not have the ability to move laterally or horizontally within the minimum clearance specified in the table below, from energized power lines;
- The equipment has been positioned and blocked to allow no part, including cables, to come within the minimum clearance specified in the table below; or
- Excavation operations are not initiated within 25 feet of the verified position of underground power lines.

Minimum Required Clearances for Energized Overhead Power Lines

Nominal System Voltage of Power Line (K V)	Minimum Required Clearance (feet)
0-50	10
51-100	12
101-200	15
201-300	20
301-500	25
501-750	35
751-1000	45

1 kilovolt (KV) = 1,000 volts

9.8 Heavy Equipment Decontamination

If a steam cleaner will be utilized to decontaminate equipment, personnel should exercise caution as the high pressure steam can cause severe burns. Protective gloves, face shields, hard hats, steel-toed boots, and Tyvek suits or rain gear will be worn when using steam cleaners.

9.9 Hot/Cold Work

Roux Associates shall not perform welding unless specific clearance and a hot work permit have been obtained from the Client's Project Engineer, PM or SM. Any contractors or Roux Associates personnel performing welding must adhere to the Client's Hot Work Procedures and the procedures outlined below.

Welding equipment shall be chosen for safe application to the work and shall be installed properly. Employees designated to operate welding equipment shall be properly instructed and qualified to operate it. Mechanical ventilation shall be provided when welding or cutting:

- Where there is less than 10,000 cubic feet of air per welder;
- Where the overhead height is less than 16 feet; and
- Where required by Client practices and procedures (e.g., Confined Space Permitting).

Proper shielding and eye protection shall be used to prevent exposure of personnel to welding hazards. Proper precautions (isolating welding and cutting, removing fire hazards from vicinity,

etc.) for fire prevention shall be taken in areas where welding or other "hot work" is being done. All welding operations and other "hot work" shall be scheduled and performed in accordance with the Client's permitting system. The SHSO will be responsible for securing these permits.

9.9.1 Welding in Confined Spaces

All welding and cutting operations carried out in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency and shall be performed in compliance with the Client's and Roux Associates' Confined Space Entry Procedures. In general, oxygen shall never be used for ventilation. In such circumstances where it is impossible to provide ventilation, OSHA requires airline respirators or hose masks approved by the National Institute for Occupational Safety and Health (NIOSH) for this purpose to be utilized. In areas immediately dangerous to life, NIOSH approved powered air purifying respirators (PAPR) or self-contained breathing apparatus (SCBA) shall be used. These exposures and tasks are not to be performed by Roux employees. If the work requires welding in confined spaces, this will only be performed by a qualified welder who is Confined Space Entry Trained (for permit-required entries) and provided with procedures and PPE that satisfy OSHA 29 CFR 1910.134.

9.10 Asbestos

Asbestos may be present at the site as pipe wrap, as part of the pipe material itself (asbestos-cement pipe), or as part of other building materials (e.g., in floor tiles and roofing). Asbestos shall be abated by a licensed abatement contractor according to all applicable laws and standards. Personnel should be aware of the presence of asbestos and avoid contact with friable material. Asbestos-cement pipe can emit airborne fibers if the materials are cut or sawed, or if they are damaged during demolition operations. Handling of these non-friable materials shall be limited to activities that will not generate airborne fibers.

9.11 Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment/clothing in hot weather environments.

Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps. The signs and symptoms of heat stress are as follows:

- Severe muscle cramps, usually in the legs and abdomen;
- Exhaustion, often to the point of collapse; and
- Dizziness or periods of faintness.

First aid treatment includes shade, rest, and fluid replacement. Normally, the individual should recover within one-half hour. If the individual is not better within 30 minutes and the body temperature has not decreased, the individual should be transported to an occupational health clinic or hospital for medical attention.

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat while working or exercising. The circulatory system of the individual fails as blood collects near the skin in an effort to rid the body of excess heat. The signs and symptoms of heat exhaustion are as follows:

- Rapid and shallow breathing;
- Weak pulse;
- Cold and clammy skin with heavy perspiration;
- Skin appears pale;
- Fatigue and weakness;
- Dizziness; and
- Elevated body temperature.

First aid treatment includes cooling the victim, elevating the feet, and replacing fluids. If the individual is not better within 30 minutes and the body temperature has not decreased, the individual should be transported to an occupational health clinic or hospital for medical attention. A New York vicinity city map with the location of Lincoln Hospital Center and City MD and Urgent Care Facility is included as Figure 3 and 4 (see colored tabs).

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a **MEDICAL EMERGENCY** requiring immediate cooling of the victim and transport to an emergency medical facility. The signs and symptoms of heat stroke are as follows:

- Dry, hot red skin;
- Body temperature approaching or above 105 degrees F;
- Large (dilated) pupils; and
- Loss of consciousness - the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to an emergency medical facility.

Heat stress is a significant hazard if any type of protective equipment (semipermeable or impermeable) which prevents evaporative cooling is worn in hot weather environments.

9.12 Cold Stress

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole body protection. Adequate insulating clothing must be used when the air temperature is below 40°F. A work/rest regimen will be initiated when ambient temperatures and protective clothing cause a stressful situation. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. The signs and symptoms of cold stress include the following:

- Severe shivering;
- Abnormal behavior;
- Slowing;
- Weakness;
- Stumbling or repeated falling;
- Inability to walk;
- Collapse; and/or
- Unconsciousness.

First aid requires removing the victim from the cold environment, and preventing further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks and encourage activity such as walking, wrapped in a blanket. If the victim's conditions do not improve, seek further medical attention.

9.13 Communications

- Telephones
  Telephones will be available for communication with emergency support services/ facilities. Telephones are located in the kiosk and are available for communication with emergency support services. In addition, Site personnel are equipped with cellular telephones. Applicable telephone and cellular phone numbers are provided in Section 1.0 (page 3) and in the colored tab section located in the back of this HASP.

- Hand Signals
  To be employed by personnel required to use Level C respiratory protection. They shall be known by the entire field team before operations commence and covered during Site-specific training.

Hand Signals

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I'm alright, okay
Thumbs down	No, negative

9.14 Additional Safe Work Practices

Refer to the SHSO for specific concerns on each individual site task. The safety rules listed below, as well as in the Client's Safe Work Practices Requirements, must be strictly followed:

- Inform SM of planned activities and evaluate the degree of health and safety protection required for each task;
- Practice contamination avoidance, avoid any skin contact with potentially contaminated materials (i.e., surface or ground water, soil, etc.);
- Hard hat and safety eye protection will be worn when inside the exclusion zone;
- Do not carry gum, cigarettes, food drink or cosmetics of any kind into contaminated areas;

- Wash hands before handling food and drink and other activities that could cause hand-to-mouth transfer of contaminants;
- Appropriate foot, hearing, eye, head, and hand protection will be worn by those directly involved in the work efforts when warranted;
- No facial hair that interferes with the face to face piece seal of respirators will be allowed;
- Personnel not involved in the operations, excavating, or monitoring activities will remain a safe distance from the equipment;
- Do not climb over/under obstacles or barricades;
- Be alert to your own physical condition;
- Watch your buddy for signs of fatigue, exposure, heat, or cold stress, etc.;
- No work will be conducted without adequate light;
- Report all accidents, no matter how minor, immediately to the SHSO and the Project Engineer; and
- **KNOW YOUR HEALTH AND SAFETY PLAN.**

10.0 DECONTAMINATION PROCEDURES

10.1 Contamination Prevention

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Do not walk through areas of obvious or known contamination;
- Do not handle or touch contaminated materials directly;
- Make sure all personal protective equipment (PPE) has no cuts, tears, or other signs of deterioration prior to donning;
- Fasten all closures on suits, covering with tape, if necessary;
- Take particular care to protect any skin injuries;
- Stay upwind of airborne contaminants; and
- Do not carry cigarettes, gum, etc., into contaminated areas.

Sampling/Monitoring

- When required by the SHSO, cover instruments with clear plastic, leaving opening for sampling and exhaust ports; and
- Bag sample containers prior to the placement of sample material.

Heavy Equipment

- Care should be taken to limit the amount of contamination that comes in contact with heavy equipment;
- Excavated soils should be contained and kept away from workers; and
- Decontaminate equipment prior to moving to another work area.

10.2 Decontamination

The SHSO shall be responsible for determining appropriate decontamination methods for all Site activities. Decontamination water should be collected, handled, drummed, and/or containerized prior to determination of classification and appropriate disposal method (see Section 11.0).

Equipment Decontamination

Sampling equipment will be decontaminated through the following steps, if necessary:

- fresh water rinse;
- non-phosphate detergent wash;
- fresh water rinse; and
- distilled water rinse.

11.0 DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left onsite. All potentially contaminated materials should be bagged, drummed, or placed in waste wranglers, as necessary, and placed in a designated area determined by the Client.

All personal protective clothing and sorbent products contaminated with petroleum product will be stored in waste storage containers (i.e., waste wranglers). Additionally, all petroleum products generated from product recovery activities (i.e., well bailing, etc.) will be drummed and stored within the hazardous waste storage area or placed in drums/storage tanks positioned in an area to be determined. All hazardous waste storage containers, tanks, and drums will be labeled with the appropriate hazardous waste labels and/or placards. All contaminated materials will be disposed of in accordance with appropriate regulations. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste.

PPE & equipment shall be decontaminated, cleaned, laundered, maintained, or replaced as needed to maintain their effectiveness. Employees whose non-impermeable clothing becomes wetted with hazardous substances shall immediately remove the clothing.

12.0 EMERGENCY PLAN

As a result of the hazards onsite and the conditions under which operations are conducted, the possibility of an emergency exists. An emergency plan is required by OSHA (29 CFR 1910.120) to be available for use and is included below. A copy of this plan shall be available in the Support zone at each work site.

In the event of an emergency situation, such as fire, explosion, significant release of particulates, etc., all persons in both the restricted and non-restricted areas will evacuate and assemble near the Support Zone or other safe area as identified by the Site Emergency Coordinator(s). The Site Emergency Coordinator(s) will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SHSO or SM must see that access for emergency equipment is provided and that all spark-producing apparatus has been shut down once the alarm has been sounded. Once the safety of all personnel is established, the fire department and other emergency response groups will be notified by telephone of the emergency. Then, other personnel listed in Section 12.4 shall be notified.

12.1 Site Emergency Coordinator(s)

The Site Emergency Coordinator(s) are:

- Site Manager;
- Site Health and Safety Officer;
- Project Engineer; and
- Facility Manager.

The Site Emergency Coordinator(s) shall implement this emergency plan whenever conditions at the site warrant such action. The coordinator(s) will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

12.2 Evacuation

Withdrawal Upwind

The work party will continually note general wind directions while onsite. Upon noting the conditions warranting movement away from the work site, the crew will move upwind a distance of approximately 100 feet or farther, as indicated by the site monitoring instruments. Donning SCBA and a lifeline, SHSO will return to the work site to determine if the condition noted was transient or persistent. If persistent, on-site personnel will be notified of the situation and the need to leave the site or don SCBA. When access to the site is restricted and escape possibly hindered, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes.

Site Evacuation

Upon determination of conditions warranting site evacuation, the work party will proceed upwind of the work site and notify the SHSO and the Client's Project Engineer of site conditions. If the hazard is toxic gas, respirators will be donned. The crew will proceed to the field office to assess the situation. The advisability and type of further response action will be coordinated and carried out by the SHSO, the PM and the Client's Project Engineer. Site evacuation routes are illustrated in Figure 7.

12.3 Potential or Actual Fire or Explosion

If the potential for a fire exists or if an actual fire or explosion occurs, the following procedure will be implemented:

- Immediately evacuate the site as described above (Section 12.2);
- Notify Client's Project Engineer, SHSO and PM; and
- Notify fire and security. Call **911**
  Fire Department – 911
  Police Department – 911

12.4 Environmental Incident (Release or Spread of Contamination)

If possible, the spread of contamination should be controlled or stopped. The Facility Manager must be informed of the need to contact police and fire authorities to inform them of the possible or immediate need for nearby evacuation. If a significant release has occurred, the National

Response Center and other appropriate groups should be contacted by the Facility Manager or his designee. Those groups will alert National or Regional Response Teams as necessary. Following these emergency calls, the remaining personnel listed in the table below shall be notified:

Emergency Telephone Numbers

Type	Name	Telephone #
Fire Department	FDNY	911
HazMat Emergency Response		911
Law Enforcement	NYPD	911
Hospital	Bronx Lebanon Hospital	(718) 860-6169
Ambulance	FDNY	911
Urgent Care Center	City MD	(212) 913-0820
National Response Center (Release or Spill)		(800) 424-8802
Client Contact	Arianna Sacks Rosenberg	
Site Health and Safety Officer	TBD	
Project Manager	Jeffrey Wills	(516) 637-0213
Corporate H&S Manager	Joseph Gentile	(856) 832-3768 (Office) (610) 844-6911 (Cell)

These contacts and phone numbers will be posted in the SZ.

12.5 Personal Injury

If on-site personnel require emergency medical treatment, the following steps will be taken:

1) Notify the Project Manager, Principal, and/or other Roux Senior Management for Illness or Injury Case Management protocol to be initiated.

2) Notify the Fire Department or Ambulance service and request an ambulance or transport the victim to the hospital, as appropriate.

3) Decontaminate to the extent possible prior to administration of first aid or movement to emergency facilities.

4) First aid will be provided by emergency medical services (EMS) or by on-site personnel trained in first aid, CPR, and blood borne pathogens, if available.

5) The OHSM will supply medical data sheets on the victim (if a Roux Associates, Inc. employee) to appropriate medical personnel.

Accident Report Forms and Medical Services Form are provided in Appendix C.

12.6 Overt Personnel Exposure

If an overt exposure to toxic materials should occur, the exposed person shall be treated onsite as follows:

Skin Contact:	Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention. An emergency shower or drench system shall be accessible at the Site at all times. Utilizing eyewash, eyes should be rinsed for at least fifteen (15) minutes upon chemical contamination.
Inhalation:	Move to fresh air and/or, if necessary, decontaminate, and transport to the hospital.
Ingestion:	Decontaminate and transport to emergency medical facility.
Puncture Wound or Laceration:	Decontaminate and transport to emergency medical facility. SHSO will coordinate with the CHSM and the HR Director to obtain medical information on the injured if necessary.

12.7 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO will determine if work can continue without sacrificing the health and safety of field workers. Some of the items to be considered prior to determining if work should continue are:

- Heavy rainfall;
- High wind;
- Potential for heat stress;
- Potential for cold stress and cold-related injuries;
- Limited visibility;
- Potential for electrical storms – stop work for a minimum of 15 minutes after observing a lightning strike and for at least 15 minutes after the storm has passed;
- Potential for malfunction of H&S monitoring equipment or gear; and
- Potential for accidents.

12.8 Reportable Incidents at the Site

Since submission of the revised HASP, there has been zero reportable incident(s) at the Site. Any incident where Roux Associates' or Roux employees' vehicles are involved in a collision with structures, equipment, other vehicles, or pedestrians will result in the notification of Roux Associates personnel and Client Managers and completion of an *ACORD*® Automobile Loss Notice Form (attached as Appendix G).

13.0 FIELD TEAM REVIEW

Each person performing work at or visiting this site shall sign this section after site-specific training is completed and before being permitted to access the CRZ or Exclusion Zone.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with the provision contained therein.

Site/Project: The Peninsula Redevelopment Project

Name Printed	Signature	Date

14.0 APPROVALS

By their signature, the undersigned certify that this HASP is approved and will be utilized at the La Central Project Site.

Site Health and Safety Officer	Date
Joseph Gentile – Corporate Health and Safety Manager	Date
Jeffrey Wills – Project Manager	Date
Frank Cherena – Project Principal	Date

TABLE

1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,1,1-Trichloroethane	71-55-6	TWA 350 ppm STEL 440 ppm C 440 ppm	C 350 ppm (1900 mg/m^3) [15-minute]	TWA 350 ppm (1900 mg/m^3)	700 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias;	Eyes, skin, central nervous system, cardiovascular system, liver	Colorless liquid with a mild, chloroform-like odor. BP: 165°F UEL: 12.5% LEL: 7.5%
1,1,2-Trichloroethane	79-00-5	TWA 10 ppm	Ca TWA 10 ppm (45 mg/m^3) [skin]	TWA 10 ppm (45 mg/m^3) [skin]	Ca [100 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]	Eyes, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, chloroform-like odor. BP: 237°F UEL: 15.5% LEL: 6%
1,1-Dichloroethane	75-34-3	TWA 100 ppm	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation skin; central nervous system depression; liver, kidney, lung damage	Skin, liver, kidneys, lungs, central nervous system	Colorless, oily liquid with a chloroform-like odor. BP: 135°F Fl.P: 2°F UEL: 11.4% LEL: 5.4%
1,1-Dichloroethene	75-35-4	TWA 5 ppm	Ca (lowest feasible concentration)	TWA 1ppm	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor. BP: 89°F Fl.P: -2°F UEL: 15.5% LEL: 6.5% Class IA Flammable Liquid
1,2,4-Trimethylbenzene	95-63-6	None established	TWA 25 ppm (125mg/m^3)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 337°F FL.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable liquid
1,2,4-Trimethylbenzene	95-63-6	TWA 25 ppm (125 mg	TWA 25 ppm (125 mg/m^3)	None established	N.D.	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 337°F Fl.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable Liquid
1,2-Dichlorobenzene	95-50-1	TWA 25 ppm STEL 50 ppm	C 50 ppm (300 mg/m^3)	C 50 ppm (300 mg/m^3)	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide] BP: 357°F Fl.P: 151°F UEL: 9.2% LEL: 2.2% Class IIIA Combustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,2-Dichloroethane	107-06-2	TWA 10 ppm	Ca TWA 1 ppm (4 mg/m^3) STEL 2 ppm (8 mg/m^3)	TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	Ca [50 ppm]	inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] BP: 182°F Fl.P: 56°F UEL: 16% LEL: 6.2% Class IB Flammable Liquid
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm (790 m	TWA 200 ppm (790 mg/m^3)	TWA 200 ppm (790 mg/m^3)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor BP: 118-140°F Fl.P: 36-39°F UEL: 12.8% LEL: 5.6% Class IB Flammable Liquid
1,3,5-Trimethylbenzene	108-67-8	None established	TWA 25 ppm (125mg/m^3)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 329°F FL.P: 122°F Class II Flammable liquid
1,3,5-Trimethylbenzene	108-67-8	TWA 25 ppm (125 mg	TWA 25 ppm (125 mg/m^3)	None established	N.D	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 329°F Fl.P: 122°F Class II Flammable Liquid
1,4-Dichlorobenzene	106-46-7	TWA 10 ppm	Ca	TWA 75 ppm (450 mg/m^3)	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin	Colorless or white crystalline solid with a mothball-like odor. [insecticide] BP: 345°F Fl.P: 150°F LEL: 2.5% Combustible Solid
2,4-Dimethylphenol	105-67-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system, mouth, throat, stomach; dizziness, weakness, fatigue, nausea, headache; systemic damage; moderate to severe eye injury.	Skin, CVS, eyes, CNS	Clear, colorless liquid with a faint ether or chloroform-like odor BP: 178°F

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
2-Butanone (MEK)	78-93-3	TWA 200 ppm (590 mg/m^3) STEL 300 ppm (885 mg/m^3)	TWA 200 ppm (590 mg/m^3) STEL 300 ppm (885 mg/m^3)	TWA 200 ppm (590 mg/m^3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor. BP: 175°F Fl.P: 16°F UEL(200°F): 11.4% LEL(200°F): 1.4% Class IB Flammable Liquid
Acenaphthene	83-32-9	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Brown solid
Acetone	67-64-1	TWA 500 ppm STEL 50 ppm	TWA 250 ppm (590 mg/m^3)	TWA 1000 ppm (2400 mg/m^3)	2500 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor BP: 133°F Fl.P: 0°F UEL: 12.8% LEL: 2.5% Class IB Flammable Liquid
Anthracene	65996-93-2	TWA 0.2 mg/m^3	Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m^3 (benzene-soluble fraction)	Ca [80 mg/m^3]	inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
Antimony	7440-36-0	TWA 0.5 mg/m^3	TWA 0.5 mg/m^3	TWA 0.5 mg/m^3	50 mg/m^3 (as Sb	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	Eyes, skin, respiratory system, cardiovascular system	Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder. BP: 2975°F
Arsenic (inorganic)	7440-38-2 (metal)	TWA 0.01 mg/m3	Ca C 0.002 mg/m3 [15-min]	TWA 0.010 mg/m3	Ca [5 mg/m3 (as As)]	Inhalation; ingestion; skin absorption; skin and/or eye contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Liver, kidneys, skin, lungs, lymphatic sys	Metal: sliver-gray or tin-white, brittle, odorless solid BP: sublimes
Asbestos	1332-21-4	TWA 0.1 f/cc	Ca 100,000 fibers/m3	TWA 0.1 fiber/cm3	Ca [IDLH value has not been determined]	Inhalation; ingestion; skin and/or eye contact	Asbestosis (chronic exposure), dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritation eyes, [potential occupational carcinogen]	Respiratory system, eyes,	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite), fibrous, odorless solids. BP: decomposes
Asphalt fumes	8052-42-4	TWA 0.5 mg/m^3(fumes)	Ca C 5 mg/m3 [15 min]	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; skin and/or eye contact	Irritation eyes, resp sys	Eyes, respiratory system	Black or dark brown cement-like substance Combustible solid
Barium	7440-39-3	TWA 0.5 mg/m3	None established	TWA 0.5 mg/m3	None established	Inhalation, ingestion, skin contact	Irritation skin, respiratory system, (	Skin, eyes, respiratory system	Yellow white powder BP: 1640 C
Benzene	71-43-2	TWA 0.5 ppm STEL 2.5 ppm	Ca TWA 0.1 ppm STEL 1 ppm	TWA 1 ppm STEL 5 ppm	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Colorless to light yellow liquid with an aromatic odor [Note: Solid below 42 °F] BP: 176°F Fl.Pt = 12°F LEL: 1.2% UEL: 7.8% Class B Flammable liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Benzo[a]anthracene	56-55-3	None established	None established	None established	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	Irritation eyes, skin, respiratory system, CNS	Skin	Pale Yellow crystal, solid BP: 438 C
Benzo[a]pyrene	50-32-8	None established	TWA 0.1 mg/m3	TWA 0.2 mg/m3	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	POISON. This material is an experimental carcinogen, mutagen, tumorigen, neoplastigen and teratogen. It is a probable carcinogen in humans and a known human mutagen. IARC Group 2A carcinogen. It is believed to cause bladder, skin and lung cancer. Exposure to it may damage the developing foetus. May cause reproductive damage. Skin, respiratory and eye irritant or burns.	Skin, eye, bladder, lung, reproductive	Yellow crystals or powder [found in cigarette smoke, coal tar, fuel exhaust gas and in many other sources] BP: 495 C
Benzo[b]fluoranthene	205-99-2	None established	TWA 0.1 mg/m3	TWA 0.2 mg/m3	None established	Inhalation; ingestion; skin and/or eye contact	No data were identified on the toxicity of benzo[b]fluoranthene to humans. Based on results of studies in animals, IARC concluded that benzo[b]fluoranthene is possibly carcinogenic to humans	Respiratory system, skin, bladder, kidneys	Off-white to tan powder
Benzo[k]fluoranthene	207-08-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory tract, gastrointestinal; fatal if swallowed, inhaled, absorbed through the skin; vomiting, nausea, diarrhea	Lungs, respiratory system	Yellow crystals BP: 480 C
Beryllium	7440-41-7 (metal)	TWA 0.002 mg/m^3	Ca C 0.0005 mg/m^3	TWA 0.002 mg/m^3 C 0.005 mg/m^3 (30 minutes) with a maximum peak of 0.025 mg/m^3	Ca [4 mg/m^3 (as Be)]	inhalation, skin and/or eye contact	Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]	Eyes, skin, respiratory system	Metal: A hard, brittle, gray-white solid. BP: 4532°F
Bis(2-ethylhexyl) phthalate	117-81-7	TWA 5 mg/m^3	TWA 5 mg/m^3 STEL 10 mg/m^3 (do not exceed during andy 15-minute work period)	TWA 5 mg/m^3	None established	inhalation, skin and/or eye contact	Irritation eyes, skin, nose, throat; affect the nervous system and liver; damage to male reproductive glands	Eyes, skin, nose, respiratory system, nervous system, reproductive system, liver	Colorless to light colored, thick liquid with slight odor
Butane	106-97-8	TWA 1000 ppm	TWA 800 ppm (1900 mg/m^3)	None established	None established	inhalation, skin and/or eye contact (liquid)	Drowsiness, narcosis, asphyxia; liquid: frostbite	central nervous system	Colorless gas with a gasoline-like or natural gas odor. BP: 31°F UEL: 8.4% LEL: 1.6% Flammable Gas

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Cadmium	7440-43-9 (metal)	TWA 0.01 mg/m^3	Ca	TWA 0.005 mg/m^3	Ca [9 mg/m^3 (as Cd)]	inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	respiratory system, kidneys, prostate, blood	Metal: Silver-white, blue-tinged lustrous, odorless solid. BP: 1409°F
Carbon Disulfide	75-15-0	TWA 1 ppm	TWA 1 ppm (3 mg/m^3) STEL 10 ppm (30 mg/m^3) [skin]	TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	Colorless to faint-yellow liquid with a sweet ether-like odor. BP: 116°F Fl.P: -22°F UEL: 50.0% LEL: 1.3% Class IB Flammable Liquid
Chlorobenzene	108-90-7	TWA 10 ppm	None established	TWA 75 ppm (350 mg/m^3)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eyes, skin, respiratory system, central nervous system, liver	Colorless liquid with an almond-like odor BP: 270°F Fl.P: 82°F UEL: 9.6% LEL: 1.3%
Chloroethane	75-00-3	TWA 100ppm	Handle with caution in the workplace	TWA 1000 ppm (2600 mg/m^3)	3800 ppm [10%LEL]	inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Liver, kidneys, respiratory system, cardiovascular system, central nervous system	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. BP: 54°F Fl.P: NA (Gas) -58°F (Liquid) UEL: 15.4% LEL: 3.8%
Chloroform	67-66-3	TWA 10 ppm	Ca STEL 2 ppm (9.78 mg/m^3) [60-minute]	C 50 ppm (240 mg/m^3)	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Liver, kidneys, heart, eyes, skin, central nervous system	Colorless liquid with a pleasant odor BP: 143°F
Chromium	7440-47-3	TWA 0.5 mg/m^3 (metal and Cr III compounds) TWA 0.05 mg/m^3 (water-soluble Cr IV compounds) TWA 0.01 mg/m^3 (insoluble Cr IV compounds)	TWA 0.5 mg/m^3	TWA 1 mg/m^3	250 mg/m^3 (as Cr)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid. BP: 4788°F
Chrysene; Phenanthrene; Pyrene; Coal tar pitch volatiles	65996-93-2	TWA 0.2 mg/m3	Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m^3 (benzene-soluble fraction)	Ca [80 mg/m^3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
cis-1,2-Dichloroethene	158-59-2	TWA 200 ppm	TWA 200 ppm	TWA 200 ppm	None established	inhalation, skin absorption, ingestion	Harmful if swallowed, inhaled, or absorbed through skin. Irritant. Narcotic. Suspected carcinogen	Skin	Colorless liquid BP: 60 C Fl.P: 4 C UEL: 12.8% LEL: 9.7 %
Copper	7440-50-8	TWA 0.2mg/m^3 (fume) 1 mg/m^3 (dusts and mists)	TWA 1 mg/m^3	TWA 1 mg/m^3	100 mg/m^3 (as Cu)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing	Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)	Noncombustible Solid in bulk form, but powdered form may ignite. BP: 4703°F
Dibenzo[a,h]anthracene	53-70-3	None established	None established	None established	None established	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin	Eyes, skin; skin photosensitization.	Colorless crystalline powder BP: 524°C
Diesel Fuel #2	68476-34-6	None established	None established	Designated as an OSHA Select Carcinogen	None established	ingestion, skin and/or eye contact	Kidney damage; potential lung damage; suspected carcinogen; irritation of eyes, skin, respiratory tract; dizziness, headache, nausea; chemical pneumonitis (from aspiration of liquid); dry, red skin; irritant contact dermatitis; eye redness, pain.	Eyes, skin, kidneys	Clear yellow brown combustible liquid; floats on water; distinct diesel petroleum hydrocarbon odor. BP: 356-716°F Fl.P: 154.4-165.2°F LEL: 0.6% UEL: 7.0%
Ethylbenzene	100-41-4	TWA 100 ppm STEL 125 ppm	TWA 100 ppm (435 mg/m^3) STEL 125 ppm (545 mg/m^3)	TWA 100 ppm (435 mg/m^3)	800 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with an aromatic odor. BP: 277°F Fl.P: 55°F UEL: 6.7% LEL: 0.8% Class IB Flammable Liquid
Fluoranthene	206-44-0	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible burns; heart and liver injury, pulmonary edema, respiratory arrest, gastrointestinal disturbances.	Heart, liver, lungs.	Yellow needles.
Fluorene	86-73-7	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation skin, digestive tract	Skin	White crystals BP: 563°F
Fuel Oil #2	68476-30-2	TWA 100mg/m^3 (aerosol and vapor, as total hydrocarbons)	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS effects; nausea, vomiting, headache, cramping, dizziness, weakness, loss of coordination,, drowsiness; kidney, liver damage	Eyes, skin, CNS	Clear or yellow to red oily liquid, kerosene-like odor BP: 347 - 689 °F UEL:5-6% LEL: 0.7-1.0%
Gasoline	8006-61-9	TWA 300 ppm STEL 500 ppm	Carcinogen	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; ingestion; skin and/or eye contact	Eyes and skin irritation, mucous membrane; dermatitis; headache; listlessness, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis; possible liver, kidney damage [Potential occupational carcinogen]	Eyes, skin, respiratory system, CNS, Liver, Kidneys	Clear liquid with a characteristic odor, aromatic Fl.Pt = -45°F LEL = 1.4% UEL = 7.6% Classs 1B Flammable Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Hexachlorobutadiene	87-68-3	TWA 0.02 ppm	Ca TWA 0.02 ppm (0.24 mg/m^3) [skin]	None established	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, kidneys	Clear, colorless liquid with a mild, turpentine-like odor. BP: 419°F
Hydrogen Sulfide	7783-06-4	TWA (1 ppm) STEL (5 ppm) (adopted values for which changes are proposed in the NIC)	C 10 ppm (15 mg/m^3) [10-minute]	C 20 ppm 50 ppm [10-minute maximum peak]	100 ppm	inhalation, skin and/or 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, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, central nervous system	Colorless gas with a strong odor of rotten eggs. BP: -77°F UEL: 44.0% LEL: 4.0% Flammable Gas
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impairment of blood forming tissue	Skin	Fluorescent green-yellow crystalline solid BP: 536 C
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impairment of blood forming tissue	Skin	Yellowish crystal solid BP: 536 C
Isopropylbenzene	98-82-8	TWA 50 ppm	TWA 50 ppm (245 mg/m^3) [skin]	TWA 50 ppm (245 mg/m^3) [skin]	900 ppm [10%LEL]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor. BP: 306°F Fl.P: 96°F UEL: 6.5% LEL: 0.9%
Kerosene	8008-20-6	TWA 200 mg/m^3	TWA 100 mg/m^3	None established	IDLH value has not been determined	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system	Colorless to yellowish, oily liquid with a strong, characteristic odor. BP: 347-617°F Fl.P: 100-162°F UEL: 5% LEL: 0.7% Class II Combustible Liquid
Lead	7439-92-1	TWA 0.05 mg/m^3	TWA (8-hour) 0.050 mg/m^3	TWA 0.050 mg/m^3	100 mg/m^3 (as Pb)	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. BP: 3164°F Noncombustible Solid in bulk form

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Manganese	7439-96-5 (metal)	TWA 0.2 mg/m^3	TWA 1 mg/m^3 STEL 3 mg/m^3	C 5 mg/m^3	500 mg/m^3 (as Mn)	inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. BP: 3564°F
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	TWA 0.01 mg/m^3 STEL 0.03 mg/m^3 [skin]	TWA 0.01 mg/m^3 STEL 0.03 mg/m^3 [skin]	TWA 0.01 mg/m^3 C 0.04 mg/m^3	2 mg/m^3 (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects	Eyes, skin, central nervous system, peripheral nervous system, kidneys	Appearance and odor vary depending upon the specific (organo) alkyl mercury compound
Mercury compounds [except (organo) alkyls] (as Hg) Mercury	7439-97-6	TWA 0.025 mg/m^3 (elemental and inorganic forms)	Hg Vapor: TWA 0.05 mg/m^3 [skin] Other: C 0.1 mg/m3 [skin]	TWA 0.1 mg/m^3	10 mg/m^3 (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eyes, skin, respiratory system, central nervous system, kidneys	Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.] BP: 674°F
Methyl tert-butyl ether (MTBE)	1634-04-4	TWA 50 ppm	No established REL	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, mucous membrane, respiratory; dizziness, nausea, headache, intoxication	Eyes, skin, mucous membrane, respiratory system, central nervous system	Colorless liquid BP: 55.2 C
Methylene Chloride	75-09-2	TWA 50 ppm, A3 - suspected human carcinogen	Ca	TWA 25 ppm STEL 125 ppm	Ca [2300 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	Eyes, skin, cardiovascular system, central nervous system	Colorless liquid with a chloroform-like odor BP: 104°F UEL: 23% LEL: 13%
Naphtha (coal tar)	8030-30-6	None established	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	1000 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; dizziness, drowsiness; dermatitis; in animals: liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Reddish-brown, mobile liquid with an aromatic odor BP: 320-428°F Fl.P: 100-109°F Class II Combustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Naphthalene	91-20-3	TWA 10 ppm STEL 15 ppm	TWA 10 ppm (50 mg/m^3) STEL 15 ppm (75 mg/m^3)	TWA 10 ppm (50 mg/m^3)	250 ppm	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	Colorless to brown solid with an odor of mothballs. BP: 424°F Fl.P: 174°F UEL: 5.9% LEL: 0.9%
n-Butylbenzene	104-51-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS depression, lung damage; nausea, vomiting, headache, dizziness, weakness, loss of coordination, blured vision, drowsiness, confusion, disorientation	Eyes, skin,repiratory system, central nervous system	Colorless liquid with a sweet odor BP: 183 C Fl.P: 59 C UEL: 5.8% LEL: 0.8%
Nickel	7440-02-0 (Metal)	TWA 1.5 mg/m^3 (elemental) TWA 0.1 mg/m^3 (soluble inorganic compounds) TWA 0.2 mg/m^3 (insoluble inorganic compounds) TWA 0.1 mg/m^3 (Nickle subsulfide)	Ca TWA 0.015 mg/m^3	TWA 1 mg/m^3	Ca [10 mg/m^3 (as Ni)]	inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Nasal cavities, lungs, skin	Metal: Lustrous, silvery, odorless solid. BP: 5139°F
Nitrobenzene	98-95-3	TWA 1 ppm	TWA 1 ppm (5 mg/m^3) [skin]	TWA 1 ppm (5 mg/m^3) [skin]	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects	Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system	Yellow, oily liquid with a pungent odor like paste shoe polish. BP: 411°F Fl.P: 190°F LEL(200°F): 1.8%
n-Propylbenzene	103-65-1	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Harmful if swallowed, Irritation eyes, skin, digestive tract, respiratory tract, central nervous system	Eyes, skin, central nervous system, respiratory system	colorless or light yellow liquid BP: 159 C Fl.P: 47 C UEL: 6% LEL: 0.8%
Petroleum hydrocarbons(Petroleum distillates)	8002-05-9	None established	TWA 350 mg/m^3 C 1800 mg/m^3 [15 min]	TWA 500 ppm (2000 mg/m^3)	1,100 [10% LEL]	Inhalation; ingestion; skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, drowsiness, headache, nausea; dried/cracked skin; chemical pneumonitis	CNS, eyes, respiratory system, skin	Colorless liquid with a gasoline or kerosene-like odor BP: 86-460°F Fl. Pt = -40 to -86°F UEL: 5.9% LEL: 1.1% Flammable liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Phenol	108-95-2	TWA 5 ppm	TWA 5 ppm (19 mg/m^3) C 15.6 ppm (60 mg/m^3) [15-minute] [skin]	TWA 5 ppm (19 mg/m^3) [skin]	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching	Eyes, skin, respiratory system, liver, kidneys	Colorless to light-pink, crystalline solid with a sweet, acrid odor. BP: 359°F UEL: 8.6% LEL: 1.8%
p-Isopropyltoluene	99-87-6	None established	None established	None established	None established	inhalation, skin absorption, eye contact	Irritation skin	CNS, skin	Colorless, clear liquid, sweetish aromatic odor BP: 350.8°F Class III Flammable liquid
sec-Butylbenzene	135-98-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, upper airway; central nervous system, headache, dizziness; gastrointestinal disturbance	Respiratory system, central nervous system, eyes, skin;	Colorless liquid BP: 344°F Fl.P: 126 °F UEL: 6.9% LEL: 0.8% Combustible liquid
Selenium	7782-49-2	TWA 0.2 mg/m^3	TWA 0.2 mg/m^3	TWA 0.2 mg/m^3	1 mg/m^3 (as Se)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eyes, skin, respiratory system, liver, kidneys, blood, spleen	Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.] BP: 1265°F
Silver	7440-22-4 (metal)	TWA 0.1 mg/m^3 (metal, dust, fumes) TWA 0.01 mg/m^3 (Soluble compounds, as Ag)	TWA 0.01 mg/m^3	TWA 0.01 mg/m^3	10 mg/m^3 (as Ag)	inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Nasal septum, skin, eyes	Metal: White, lustrous solid BP: 3632°F
Slop Oil	69029-75-0	None established	None established	None established	None established	Inhalation; ingestion	Irritation eyes, skin, gastrointestinal tract	Eyes, skin, gastrointestinal tract	Clear light to dark amber liquid, with mild hydrocarbon odor. BP: >500°F Fl.P : 250°F
Sulfuric Acid	7664-93-9	TWA 0.2 mg/m^3	TWA 1 mg/m^3	TWA 1 mg/m^3	15 mg/m^3	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis	Eyes, skin, respiratory system, teeth	Colorless to dark-brown, oily, odorless liquid. BP: 554°F Noncombustible Liquid
tert-Butylbenzene	98-06-6	None established	None established	None established	None established	inhalation, skin absorption, ingestion,	Eye and respiratory irritant; CNS depression; liver or kidney damage	Respiratory system, central nervous system, eyes, liver, kidney	Colorless liquid with an aromatic odor BP: 168 - 169 C Fl.P: 34 C UEL:5.6 % LEL: 0.8 %

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 430 Westchester Avenue, Bronx, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm (STEL) listed as A3, animal carcinogen	Ca Minimize workplace exposure concentrations	TWA 100 ppm C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor. BP: 250°F Noncombustible Liquid
Toluene	108-88-3	TWA 20 ppm	TWA 100 ppm (375 mg/m^3) STEL 150 ppm (560 mg/m^3)	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, pungent, benzene-like odor. BP: 232°F Fl.P: 40°F UEL: 7.1% LEL: 1.1% Class IB Flammable Liquid
trans-1,2-Dichloroethene	156-60-5	TWA 200 ppm	None established	TWA 200 ppm STEL 250 ppm (skin)	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Narcotic. Irritation eyes, skin, respiratory tract, mucous membrane; CNS depression.	Respiratory tract, mucous membrane, eyes, skin, CNS	Colorless liquid with a fruity pleasant odor BP: 48°C Fl.P 6C UEL: 12.8% LEL: 9.7%
Trichloroethene	79-01-6	TWA 10 ppm STEL 25 ppm	Ca	TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)	Ca [1000 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid (unless dyed blue) with a chloroform-like odor. BP: 189°F UEL(77°F): 10.5% LEL(77°F): 8%
Vinyl Chloride	75-01-4	TWA 1 ppm	Carcinogen	TWA 1 ppm C 5 ppm [15-minute]	Ca [IDLH value has not been determined]	inhalation, skin, and/or eye contact (liquid)	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Liver, central nervous system, blood, respiratory system, lymphatic system	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. BP: 7°F UEL: 33.0% LEL: 3.6% Flammable Gas
Xylene (m, o & p isomers)	108-38-3, 95-47-6, 106-42-3	TWA 100 ppm (435 mg/m^3) STEL 150 ppm	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	900 ppm	Skin absorption, inhalation, ingestion, skin, and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Colorless liquid with an aromatic odor BP: 282°F, 292°F, 281°F Fl. Pt. 82°F, 90°F, 81°F LEL: 1.1%, 0.9%, 1.1% UEL: 7.0%, 6.7%, 7.0% Classs C Flammable Liquid
Zinc	7440-66-6	TWA 10 mg/m3 (Inhalable fraction)	None established	TWA 10 mg/m3 (for zinc oxide fume)	None established	skin and/or eye contact, inhalation, ingestion	Irritation eyes, skin, respiratory tract; gastrointestinal disturbances	Eyes, skin, respiratory system	Bluish gray solid BP: 1664.6°F Flammable

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 1221 Spofford Avenue, Bronx, New York

References

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NIOSH Pocket Guide to Chemical Hazards. 2005. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health

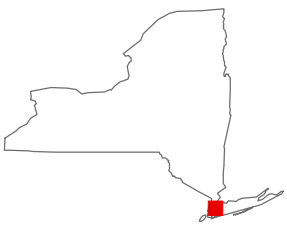
Abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists.
BP – boiling point at 1 atmosphere, °F
C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.
Ca - considered by NIOSH to be a potential occupational carcinogen
CAS# Chemical Abstracts Service registry number which is unique for each chemical.
Fl. Pt. – Flash point
IDLH - Immediately Dangerous to Life and Health concentrations represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
LEL – Lower explosive (flammable) limit in air, % by volume (at room temperature)
mg/m^3 – Milligrams of substance per cubic meter of air
NIOSH -National Institute for Occupational Safety and Health.
OSHA – Occupational Safety and Health Administration
PEL - OSHA Permissible Exposure Limit (usually) a time weighted average concentration that must not be exceeded during any 8 hour work shift of a 40 hr work week.
ppm – parts per million
REL – NIOSH Recommended Limit indicated a time weighted average concentration that must not be exceeded during any 10 hour work shift of a 40 hr work week
STEL – Short-term exposure limit
TLV -ACGIH Threshold Limit Values (usually 8 hour time weighted average concentrations).
TWA – 8-hour, time-weighted average
UEL – Upper explosive (flammable) limit in air, % by volume (at room temperature)

FIGURES

1. Site Location
2. Site Plan
3. Route to Hospital
4. Route to Urgent Care Center

QUADRANGLE LOCATION



N

1,000 0 1,000 2,000

Feet

Title:

SITE LOCATION MAP

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: J.P.G.	Date: 16JUN17
Prepared by: M.R.	Scale: AS SHOWN
Project Mgr: J.P.G.	Project: 2611.0002Y000
File: 2611.0002Y104.1.mxd	

FIGURE 1

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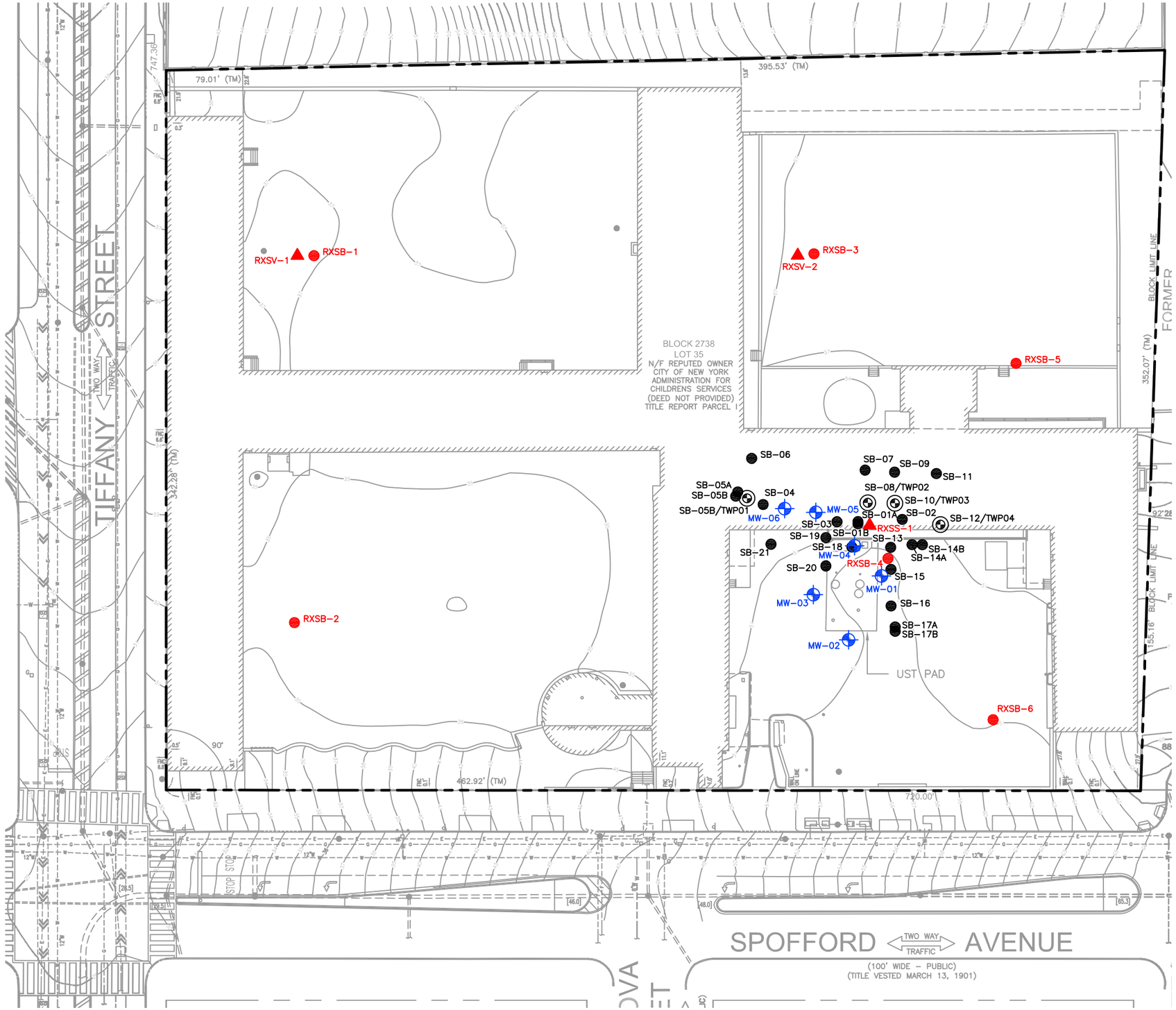

LEGEND

- SITE BOUNDARY
- SB-06 — SOIL BORING LOCATION FROM LOUIS BERGER AND ASSOC., P.C., 2009 INVESTIGATION
- SB-08/TWP02 — COLOCATED SOIL BORING AND TEMPORARY WELL LOCATION FROM LOUIS BERGER AND ASSOC., P.C., 2009 INVESTIGATION
- MW-03 — MONITORING WELL LOCATION INSTALLED BY URS 2014
- RXSB-3 — APPROXIMATE SOIL BORING LOCATION FROM ROUX ASSOCIATES 2017 INVESTIGATION
- RXSS-1 / RXSV-2 — APPROXIMATE SUB SLAB/SOIL VAPOR POINT FROM ROUX ASSOCIATES 2017 INVESTIGATION

50' 0 50'

Title:

SITE PLAN

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.S.	Date: 15JUN17	FIGURE 2
Prepared by: G.M.	Scale: AS SHOWN	
Project Mgr: F.C.	Project: 2611.0002Y000	
File: 2611.0002Y104.01.DWG		

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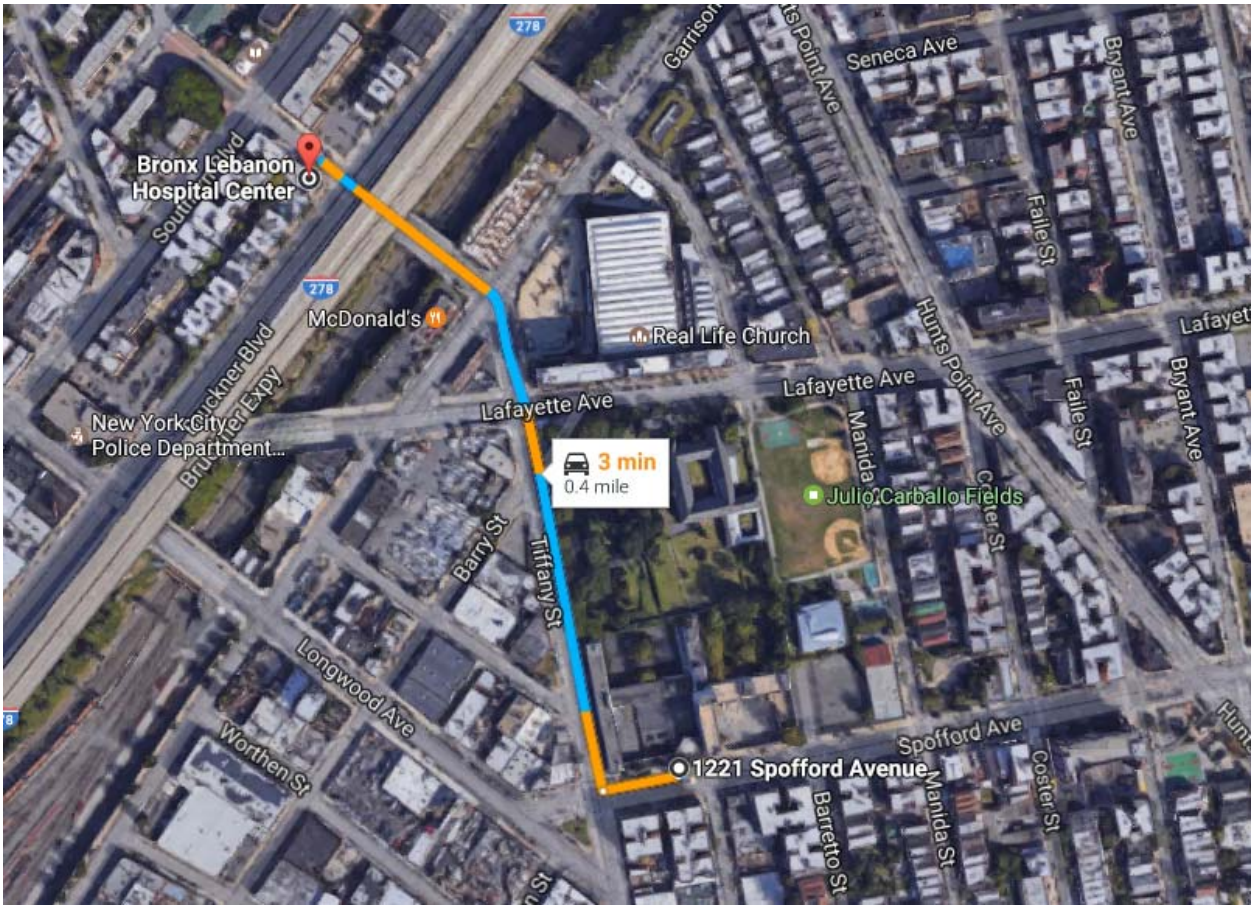
Figure 3. Directions to Bronx Lebanon Hospital Center



Bronx Lebanon Hospital Center
853 Tiffany Street
Bronx, New York, 10459

- Head west on Spofford Avenue toward Tiffany Street (187 feet);
- Turn right onto Tiffany Street (0.3 mi);
- Slight left near Garrison Ave;
- Destination will be on the left.

Figure 4. Directions to City MD

City MD
80 West 125th Street
New York, New York

- 1221 Spofford Avenue, Bronx, New York;
- Head west on Spofford Avenue toward Tiffany Street (413 feet);
- Turn Right onto Longwood Avenue (0.2 mi);
- Turn left at the 3rd cross street onto Bruckner Blvd (1.0 mi);
- Keep left to stay on Bruckner Blvd (1.2 mi);
- Use middle lane to continue on Third Avenue Bridge (0.3 mi);
- Keep right to stay on Third Avenue Bridge (243 ft);
- Continue straight on E 129th Street (0.3 mi);
- Turn left onto 5th Avenue. (0.2 mi);
- Turn right onto West 125th Street, destination will be on the left (0.2 mi).

APPENDICES

A. Job Safety Analysis Forms

B. Hazard Communication MSDS/SDS for Chemicals Used

C. Roux Health and Safety Lessons Learned/Accident Report Forms

D. Health and Safety Briefing/Meeting Log and Daily Site Safety Checklist

E. Roux Heavy Equipment Exclusion Zone Policy

F. Roux Subsurface Utility Clearance Procedure

G. *ACORD*® Automobile Loss Notice Form

H. Job Safety and Health Protection Poster

I. Generic Community Air Monitoring Plan (CAMP)

APPENDIX A

Job Safety Analysis Forms

List Job Safety Analyses Forms which are required for the project and are included in Appendix A below:

1. Job Safety Analysis Form
2. Site Walk and Inspection
3. Mobilization and Demobilization
4. Pre-Clearing
5. Sonic Drilling
6. Soil Sampling
7. Drum Handling
8. Well Development
9. Soil Vapor Sampling
10. Groundwater Sampling

JOB SAFETY ANALYSIS	Cntrl. No.	DATE:	☒ NEW ☐ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY **GENERIC**	WORK TYPE	WORK ACTIVITY (Description)	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☐ GLOVES:
☐ HARD HAT	☐ FACE SHIELD		☐ OTHER
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☐ SUPPLIED RESPIRATOR	
☐ SAFETY GLASSES	☐ SAFETY SHOES	☐ PPE CLOTHING:	

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment:

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A _ foot exclusion zone will be maintained around (indicate equipment).

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. [INSERT JOB STEP]	**1a. CONTACT:** [INSERT HAZARD]	1a.
	1b. CAUGHT: [INSERT HAZARD]	1b.
	1c. FALL: [INSERT HAZARD]	1c.
	1d. EXPOSURE: [INSERT HAZARD]	1d.
	1e. EXERTION: [INSERT HAZARD]	1e.
	1f. ENERGY SOURCE: [INSERT HAZARD]	1f.
2. [INSERT JOB STEP]	**2a. CONTACT:** [INSERT HAZARD]	2a.
	2b. CAUGHT: [INSERT HAZARD]	2b.

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[2] A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards.

[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

	2c. FALL: [INSERT HAZARD]	2c.
	2d. EXPOSURE: [INSERT HAZARD]	2d.
	2e. EXERTION: [INSERT HAZARD]	2e.
	2f. ENERGY SOURCE: [INSERT HAZARD]	2f.

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JOB SAFETY ANALYSIS	Cntrl. No. GEN-011	DATE: 1/18/2015	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Site Recon**	**Site Walk and Inspection**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Anthony Giannetti	Staff Geologist	Daniel Abberton	SHSM
		Mike Ritorto	Project Hydrogeologist
		Joe Gentile	CHSM

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: ear plugs as necessary ☒ SAFETY SHOES: Steel or composite toed	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: High-visibility vest or high-vis outerwear, sleeved shirt	☒ GLOVES: Leather/cut-resistant/chemical resistant ☒ OTHER: tyvek and rubber boots as necessary, dust mask as necessary

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Site map and/or guide familiar with Site, operating cell phone or walkie-talkie if Site allows.

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE (EZ): A minimum 10' exclusion zone will be maintained around equipment.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Check in with Site manager.	**1a. CONTACT/EXPOSURE/FALL:** Lack of communication could result in H&S incident.	1a. Inform Site personnel of work scope, timeline and location(s). 1a. Inquire about hazards and other activities taking place at the Site. 1a. Discuss emergency evacuation procedures and muster points with Site manager..
2. Traversing the Site and setting up at work locations.	**2a. CONTACT:** Property damage and personal injury caused by obstructions/vehicles or unauthorized personnel at remote Sites.	2a. Maintain speed limit of 5 mph on-site. 2a. All equipment must be stowed and secured prior to moving. Use wheel chocks on all construction vehicles when not in motion. 2a. Drive on established roadways. 2a. Yield to all pedestrians. 2a. Do not back up vehicle without spotter where visibility is limited; use pull-through spots or back into parking spots; use an audible signal (horn/back-up alarm) when backing up vehicles. 2a. Wear high visibility clothing/safety vest. If working at remote Site, add orange accessories during hunting season.
	2b. FALL: Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone.	2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2b. Use established pathways and walk on stable, secure ground. 2b. Communicate traversing hazards with others
	2c. OVEREXERTION: Muscle strain while carrying equipment.	2c. When carrying equipment to/from work area, use proper lifting techniques; keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use mechanical assistance or make multiple trips to carry equipment. 2c. Two people or a mechanical lifting device are required when lifting objects over 50 lbs or when the shape makes the object difficult to lift.
	2d. EXPOSURE: Biological hazards - ticks, bees/wasps, poison ivy, insects, etc. (Ticks are most active any time the temperature is above freezing, typically from March to November.)	2d. Inspect area to avoid contact with biological hazards. 2d. Ticks: • Treat outer clothing including pants, shirts, socks, boots and hats the evening before use with Permethrin (allowing at least two hours before use). • Apply DEET to exposed skin before travelling to the Site and reapply after two hours. • Check for ticks during and after work. 2d. Bees: Use bee spray to remove nests. Protect exposed skin with insect repellent. 2d. Poison Ivy: • Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas. • If skin comes in contact with poison ivy, wash skin thoroughly with soap and water.

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	2e. EXPOSURE: Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected. 2e. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 2e. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 2e. Wear appropriate rain gear as needed. 2e. Take frequent breaks if tired, wet, or cold/hot. Drink water. 2e. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
3. Define and secure the work area.	**3a. CONTACT:** Personal injury or property damage from other vehicles on-site.	3a. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 3a. Look both ways in high traffic areas. 3a. Position vehicle to protect against oncoming traffic. 3a. Use 42” traffic cone and caution tape to delineate work area. Use a spotter in high traffic areas. 3a. Wear high visibility clothing/safety vest.
4. Walking near heavy equipment and machinery.	**4a. CONTACT:** Personal injury from Site and roadway traffic. Personal injury from flying debris.	4a. See 3a. 4a. Place traffic cones to re-direct traffic flow around work area and to alert others as to activity taking place. Evaluate possible need for police detail and request as needed. 4a. Maintain a minimum exclusion zone of 10 feet from all equipment. Task specific JSAs should be referenced to determine the actual exclusion zone for the piece of equipment being used. 4a. Keep body parts out of the line of fire of pinch points. 4a. Routinely inspect work area and be aware of location of all Site personnel. Make eye contact with spotter, if provided, or operator prior to entering the work area. 4a. Wear safety glasses at all times.
	4b. OVEREXERTION: Personal injury from lifting/moving/rotating equipment.	4b. See 2c.
	4c. EXPOSURE: Hearing damage from excavation activities. Inhalation/exposure to hazardous vapors and or dust.	4c. Monitor air quality with multi-gas meter and dust meter, if necessary. Use water to suppress dust, if necessary. Wear dust mask, if necessary. 4c. Wear hearing protection if >85 dBA. 4c. Always wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects, glassware or cutting tools.
	4d. EXPOSURE: Working in a remote area.	4d. Use the "buddy system" whenever possible. If working alone, contact PM upon arrival/departure, as well as during work activities prior to commencing work. 4d. Always carry a communication (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) device when traversing remote areas.
5. Working in adverse weather conditions.	**5a. EXPOSURE:** Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	5a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 5a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 5a. Wear appropriate rain gear as needed. 5a. Take frequent breaks if tired, wet, or cold/hot. Drink water. 5a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
6. Departing Site.	**6a. EXPOSURE:** Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search.	6a. Sign out or notify Site personnel of your departure.

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JOB SAFETY ANALYSIS	Cntrl. No. GEN-010	DATE: 1/15/2014	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Site Recon**	**Mobilization/Demobilization**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Jared Lefkowitz	Staff Assistant Scientist	Daniel Abberton	SHSM
John Williams	OHSM	Mike Ritorto	Project Hydrogeologist
		Joe Gentile	CHSM

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Leather, nitrile, and cut resistant (as needed)
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER
☐ LIFELINE / BODY HARNESS	☒ HEARING PROTECTION (as needed)	☒ PPE CLOTHING: Fluorescent reflective vest of high-visibility clothing; sleeved shirt; long pants	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel Toe or composite toe		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: None

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A minimum exclusion zone of 10' will be maintained around moving equipment (if heavy equipment is utilized)

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilize/demobilize and establish work area	**1a. FALL:** Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.	1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle. 1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways. Walk on stable/secure ground. 1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping; organize and store equipment neatly in one area. 1a. Wear boots with adequate treads. 1a. Delineate unsafe areas with 42" cones, caution tape and/or flagging.
	1b. CONTACT: Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.	1b. Observe and maintain the posted speed limits. 1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers. 1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities and to discuss any special hazards. Ensure that short-service employees (SSE) are identified. 1b. Identify potential traffic sources. 1b. Wear PPE including high visibility clothing or reflective vest. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing whenever possible. 1b. Maintain a minimum 10' exclusion zone when vehicles are in motion. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1b. Delineate work area with 42" cones, flags, caution tape, and/or other barriers. 1b. Position "Work Area" signs at Site entrances, if possible, or at either side of work area. 1b. Position largest vehicle to protect against oncoming traffic. 1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route. 1b. Observe potential overhead and ground surface features that may interfere with moving equipment. Clear the path of physical hazards prior initiating mobilization.
	1c. CAUGHT: Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.	1c. Make sure driver has engaged parking brake and placed wheel chocks in a position to prevent movement. Be sure that vehicle is parked in front/down gradient of work area. 1c. Wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools/glass. 1c. Keep body parts away from line-of-fire of equipment. 1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure.

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		1c. Remove any loose jewelry. Avoid wearing loose clothing and/or ensure loose clothing is secure. 1c. Secure all items on the equipment, tighten up any items or features that have potential to shift or break during mobilization.
	1d. OVEREXERTION: Muscle strains while lifting/carrying equipment.	1d. Use body positioning and lifting techniques that avoid muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load. 1d. Ensure that loads are balanced. Use assistance (mechanical or additional person) to carry equipment that is either unwieldy or over 50 lbs.
	1e. EXPOSURE: Personal injury from exposure to biological and environmental hazards.	1e. Inspect area to avoid contact with biological hazards (i.e. poisonous plants, stinging insects, ticks, etc.). 1e. Wear long sleeved clothes treated with Permethrin, apply insect repellant containing DEET to exposed skin, and inspect clothes and skin for ticks during and after work. 1e. Apply sunscreen (SPF 15+) if exposure to sun for 30 minutes or more is expected.
	1f. EXPOSURE: Heat and cold related injuries.	1f. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 1f. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 1f. Wear clothing appropriate for weather and temperature conditions (e.g., rain jackets, snow pants, multiple layers). 1f. If lightning is observed, wait 30 minutes in a sheltered location (car is acceptable) before resuming work.
	1g. EXPOSURE: Personal injury from noise hazards.	1g. Wear hearing protection if sound levels exceed 85 dBA (if you must raise your voice for normal conversation).

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JOB SAFETY ANALYSIS	Cntrl. No. GEN-009	DATE: 2/11/2015	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Hand Tools**	**Pre-Clearing activities, including Air Knifing and Soil Vacuuming**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Alyssa Lau	Staff Engineer	Daniel Abberton	SHSM
		Mike Ritorto	Senior Hydrogeologist
		Laura Jensen	Staff Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☒ FACE SHIELD (while air knifing) ☒ HEARING PROTECTION (as needed) ☒ SAFETY SHOES: Steel or composite toed	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Nitrile and cut resistant ☒ OTHER: Dust mask (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Air Knife, Vactor Truck (Vac Truck), Compressor, Hand Tools, Circular Saw, Dust Mask, Photoionization Detector, Multi-Gas Meter, Traffic Cones, Rigid Barrier, Caution Tape, 20 lb. Fire Extinguisher, "Work Area" and/or "Exclusion Zone" Signs

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A 10 foot exclusion zone will be maintained around air knife and/or soil vacuum operations.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Verify pre-clearance protocol.	1a. **CONTACT**: Underground utility damage; property damage; personal injury. See Site Walk Inspection JSA for potential hazards.	1a. Confirm that local utility companies were contacted prior to drilling. 1a. Walk the Site to evaluate utility markings and review maps (**See Site Walk Inspection JSA for critical actions**). 1a. Review pre-clearing checklist form and sub-surface clearance form. Pre-clearing protocol indicates that clearance must be conducted to a minimum of 5 vertical feet below ground surface or 8 vertical feet below ground surface in the critical zone using hand tools.
2. Mobilize/demobilize and establish work area.	2a. **See Mobilization / Demobilization JSA for potential hazards.**	2a. **See Mobilization / Demobilization JSA for critical actions.**
3. Pre-clear with air knife, water lance, and soil vacuum, and/or clearance with hand tools	3a. **CONTACT**: Flying debris striking face or body 3b. **EXPOSURE/ENERGY SOURCE**: Inhalation/exposure to hazardous vapors; inhalation/exposure to dust; electrocution. 3c. **CONTACT:** Damage to unknown/known utility with air knife. 3d. **ERGONOMICS** Poor body positioning when handling equipment and materials.	3a. **Maintain 10 foot exclusion zone.** Only (air knife/vac truck) operator and designated helper shall remain within exclusion zone while air knife/vac truck is active. Use the required PPE, including (at a minimum), cut resistant gloves, safety glasses with side shields, and long sleeved shirt. 3a. Wear a face shield to protect face from flying debris when using air knife. 3a. Aim air knife tip away from self and others, so to avoid line-of-fire hazards. 3a. Use anti-whip devices on compressor hoses. 3b. Monitor breathing zone with a calibrated PID and multi-gas meter. If vapors sustain levels > 5 ppm, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux Project Manager of the condition. The Roux Project Manager will then recommend additional precautions. 3b. Wear dust masks as needed 3b. Ensure no open flames/heat sources are present within the work area. 3b. No open flames/heat sources. 3b. Ensure vac truck is properly grounded prior to use. 3b. Do not use metal dig bar; use fiberglass or equivalent. 3c. Avoid contacting utilities directly with the high pressure air stream and using the air knife tip as a physical digging tool. 3c. Keep the air knife tip constantly moving to reduce direct pressure on a potential utility. 3c. increase the distance between air knife tip and soil/utility. 3c. Continually remove soil slurry from hole with vacuum, which may have an abrasive effect on utility casings. 3d. Use proper body positioning and lifting techniques that minimizes muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Pre-clearing with air knife and soil vacuum, and/or clearance with hand tools (continued)	3d. **ERGONOMICS**: (continued) Poor body positioning when handling equipment and materials.	3d. Ensure that loads are balanced to reduce the potential for muscle strain. 3d. Two people or a mechanical lifting aid are required when lifting objects over 50 lb. or when the shape makes the object difficult to lift.
	3e. **FALL**: Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site.	3e. Inspect walking path for uneven terrain, weather-related hazards (e.g., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 3e. Walk around any stored materials/equipment; do not climb over. Practice good housekeeping. 3e. Use established pathways and walk on stable, secure ground. 3e. Equipment and tools will be stored at the lowest point of potential energy and out of the walkway and immediate work area (i.e., tools should not be propped against walls or nearby equipment or vehicles). 3e. Equipment and tools that are not anticipated to be used will be returned to a storage area that is out of the immediate work area. 3e. Ensure power cords/hoses are grouped when used within the work area. Mark out cords/hoses that cross pathways with traffic cones. 3e. Ensure all Site personnel and equipment stay a minimum of 2 feet from an open hole. Mark out open holes with traffic cones/caution tape, etc. 3e. Pre-cleared location will be finished flush to grade as to prevent a slip/trip hazard.
	3f. **CAUGHT**: Pinch points or amputation points associated with the equipment and vacuum hose.	3f. Always wear cut-resistant gloves when making connections and using hand tools. 3f. Inspect the equipment prior to use for potential pinch points. 3f. Test all emergency shutdown devices prior to using equipment. 3f. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3f. **All non-essential personnel shall maintain a 10 foot exclusion zone**; position body out of the line-of-fire. 3f. **Drillers and helpers will understand and use the "Show Me Your Hands Policy".**
	3g. **EXPOSURE**: Noise from vac truck and/or air compressor.	3g. Wear hearing protection when vac truck and air compressor are in operation. Otherwise, if sound levels exceed 85 dB, don hearing protection.
4. Move drum to staging area using drum cart.	4a. **EXPOSURE/CONTACT**: Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil).	4a. Wear chemically resistant gloves (i.e., Nitrile; worn in addition to cut resistant gloves). 4a. Do not overfill drums. Ensure that the drum lids are attached securely. 4a. Stage all drums in the designated storage area (per Roux Project Manager) and ensure they are labeled.
	4b. **ERGONOMICS**: Muscle strain while maneuvering drums with drum cart/lift gate.	4b. See 3d. Do not overfill drums. Use lift gate on back of truck to load and unload drums or drum cart to transport drums.
	4c. **CAUGHT**: Pinch points or amputation points associated with handling drum lid.	4c. Ensure that fingers are not placed under the lid of the drum. Wear cut-resistant gloves. Use 15/16" ratchet while sealing drum lid.
5. Decontaminate equipment and tools.	5a. **EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).	5a. See 4a. 5a. Contain decontamination water (closed lid) so that it does not spill. 5a. Use an absorbent pad to clean spills, if necessary. 5a. Store all impacted materials/PPE in a designated storage container (per Roux Project Manager) and ensure the container is labeled.
	5b. **EXPOSURE**: To chemicals in cleaning solution.	5b. See 4a.

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JOB SAFETY ANALYSIS Ctrl. No. GEN-004	DATE 1/8/2015	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE:	WORK ACTIVITY (Description):	
Generic	**Drilling**	**Direct Push Soil Borings / Well Installation**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Jeffrey Wills	Project Hydrogeologist	Laura Jensen	Staff Hydrogeologist
		Dan Abberton	Health and Safety Officer
		Michael Ritorto	Senior Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing, Sleeved Shirt	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Geoprobe or Truck-Mounted Direct Push Drill Rig, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Macrocore liners, Liner Opening Tool, 20 lb. Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs, Water

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Exclusion Zone Policy – All non-essential personnel will maintain a distance of 10 feet from drilling equipment while moving/engaged.

"SHOW ME YOUR HANDS"
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	1a. **CONTACT**: Equipment/property damage.	1a. The drill rig's tower/derrick will be lowered and secured prior to mobilization. 1a. A spotter should be utilized while moving the drill rig. If personnel move into the path of the drill rig, the drill rig will be stopped until the path is again clear. Use a spotter for all required backing operations. 1a. Set-up the work area and position equipment in a manner that eliminates or reduces the need for backing of support trucks and trailers. 1a. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed. 1a. Drill rig should have a minimum **exclusion zone of 10 feet** for non-essential personnel (i.e., driller helper, geologist) when the rig is moving/ in operation.
	1b. **FALL**: Slip/trip/fall hazards.	1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1b. Use established pathways and walk on stable, secure ground.
2. Raising tower/derrick of drill rig	2a. **CONTACT**: Overhead hazards.	2a. Prior to raising the tower/derrick, the area above the drilling rig will be inspected for wires, tree limbs, piping, or other structures, that could come in contact with the rig's tower and/or drilling rods or tools. 2a. Maintain a safe distance of 10' from overhead structures.
	2b. **CONTACT**: Pinch Points/Amputation Points when raising the rig and instability of rig	2b. Inspect the equipment prior to use and avoid pinch/amputation points. 2b. Lower out riggers on rig to ensure stability prior to raising rig tower/derrick. 2b. If the rig needs to be mounted, be sure to use three points of contact.
3. Advancement of drilling equipment and well installation	3a. **CONTACT**: Flying debris	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Advancement of drilling equipment and well installation (Continued)	3b. **EXPOSURE**: Noise and dust.	3b. Wet borehole area with sprayer to minimize dust. 3b. Stand upwind and keep body away from rig. 3b. Dust mask should be worn if conditions warrant. 3b. Wear hearing protection when the drill rig is in operation.
	3c. **CAUGHT**: Limb/extremity pinching; abrasion/crushing.	3c. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 3c. Inspect the equipment prior to use for potential pinch/amputation points. Keep hands away from being between pinch/amputation points and use of tools is preferable compared to fingers and hands. 3c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. 3c. Drillers and helpers will understand and use the “Show Me Your Hands” Policy. 3c. Spinning rods/casing have an **exclusion zone of 10 feet** while in operation.
	3d. **CONTACT**: Equipment imbalance during advancement of drill equipment.	3d. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 3d. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred. 3d. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (**minimum exclusion zone of 10 feet**).
	3e. **EXPOSURE**: Inhalation of contamination/vapors.	3e. Air monitoring using a calibrated photoionization detector (PID) will be used to periodically to monitor the breathing zone of the work area. 3e. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional precautions in accordance with the site specific health and safety plan.
	3f. **FALL**: Slip/trip/fall hazards.	3f. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area. 3f. See 1b.
	3g. **EXERTION**: Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.	3g. Keep back straight and bend at the knees. 3g. Utilize team lifting for objects over 50lbs. 3g. Use mechanical lifting device for odd shaped objects.
4. Decontaminate equipment.	4a. **EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).	4a. Wear chemical-resistant disposable gloves and safety glasses. 4a. Contain decontamination water so that it does not spill. 4a. Use an absorbent pad to clean spills, if necessary. 4a. See 3b.
	4b. **EXPOSURE:** To chemicals in cleaning solution including ammonia.	4b. See 4a. Review SDS to ensure appropriate precautions are taken and understood.

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JOB SAFETY ANALYSIS	Ctrl. No.	DATE 1/23/2015	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE:	WORK ACTIVITY (Description):	
Generic	**Drilling**	**Hollow Stem Auger Soil Borings /Well Installation**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Gina Vanderlin	Project Scientist	Joseph Gentile	CSHM

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES steel or composite toe	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: fluorescent sleeved shirt or sleeved shirt and reflective safety vest.	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Truck-Mounted Drilling Rig or Track Rig, Saw, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Interface Probe, 20 lb. Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE POLICY – All non-essential personnel shall maintain a **10 foot** exclusion zone while drill rig is engaged

"SHOW ME YOUR HANDS"
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization of drilling rig	1a. **CONTACT**: Equipment or property damage.	1a. The drill rig's tower/derrick will be lowered and secured prior to mobilization. 1a. A spotter should be utilized while moving or backing the drill rig. If personnel move into the path of the drilling rig, the drilling rig will be stopped until the path is again clear. 1a. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers. 1a. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed.
	1b. **FALL**: Slip/trip/fall hazards.	1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1b. Use established pathways and walk on stable, secure ground. 1b. Use three points of contact when mounting or dismounting the rig.
2. Raising tower/derrick of drilling rig	2a. **CONTACT**: Overhead hazards.	2a. Prior to raising the tower/derrick, area above the drilling rig will be inspected for overhead hazards (wires, tree limbs, piping, or other structures) that may be contacted by the rig's tower or drilling rods. 2a. The tower/derrick must not be raised beneath overhead power lines unless approved by both the ExxonMobil and Roux PMs. 2a. Maintain at a minimum 10' from overhead structures. 2a. Do not move the rig while the tower/derrick is raised.
	2b. **CONTACT**: Pinch points when raising the rig; crushing hazard with stability of rig during set-up	2b. Inspect the equipment prior to use and avoid placing hands near pinch points. 2b. Lower out riggers on rig to ensure stability prior to raising rig tower derrick. 2b. Inspect the set-up location for uneven terrain. Level or avoid area if needed.
3. Advancement of augers for soil borings and well material installation.	3a. **CONTACT:** Flying / spraying debris.	3a. Wear minimum level D PPE 3a. Be aware of and avoid potential lines of fire.
	3b. **EXPOSURE:** Noise and dust.	3b. Wet borehole area with sprayer to minimize dust. Stand upwind and keep body positioned away from rig. 3b. Wear hearing protection while drill rig is operating/or the noise levels exceed 85dBA.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
4. Advancement of augers for soil borings, and well material installation (Continued).	4c. **CAUGHT**: Limb/extremity pinching, abrasion, and crushing.	4c. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 4c. Test all emergency shutdown devices prior to drilling. 4c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 4c. Inspect augers; do not use if auger flight if damaged or bent. 4c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 4c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment particularly when installing auger flights. 4c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy. 4c. Spinning augers should have an **exclusion zone of 20 feet** when in operation.
	4d. **CONTACT**: Equipment imbalance during advancement of drill equipment.	4d. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 4d. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred.
	4e. **EXPOSURE**: Inhalation of contamination/vapors.	4e. Air monitoring using a calibrated photoionization detector (PID) will be used to periodically monitor the breathing zone of the work area. 4e. The Action Level for breathing zone air is five parts per million (sustained) as detected by the PID. 4e. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional appropriate precautions in accordance with the site specific health and safety plan.
	4f. **FALL**: Slip/trip/fall hazards.	4f. See 1b. 4f. Remove soil cuttings to avoid a tripping hazard from developing near augers.
	4g. **EXERTION**: Installing well casings and lifting augers.	4g. Keep back straight and bend at the knees. 4g. Utilize team lifting for objects over 50lbs. 4g. Use mechanical lifting device for odd shaped objects.
	4h. **CONTACT**: Using hand tools to install well casings and materials	4h. Wear cut resistant and leather gloves. 4h, Secure materials on a level surface before cutting 4h. Place hands out of the line of fire 4h. Inspect all tools prior to use and remove damaged tools from service
5. Cleaning the auger flights	5a. **CONTACT:** Cuts/scrapes or puncture wound from contacting rotating auger.	5a. Follow "No Hands" Procedure and make sure auger is out of gear before contacting auger with hands or tool. 5b. When using a cleaning tool, pull across your body with handle away from body; do not push toward the auger. 5b. Do not clean more than ¾ turn around the auger at a time. 5b. Wear cut resistant and leather gloves. 5b. Always use two hands when operating cleaning tool. 5b. Inspect any tool before use and remove from service if handle or metal are cracked/fatigued. 5b. Stand out of the line of fire.
6. Decontaminate equipment.	6a. **EXPOSURE/CONTACT:** To contamination (e.g., contaminated groundwater, vapors). 6b. **EXPOSURE**: To chemicals in cleaning solution (including ammonia)	6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. Contain decontamination water so that it does not spill. 6a. Use an absorbent pad to clean spills, if necessary. 6b. See 5a.

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JOB SAFETY ANALYSIS Cntrl. No. GEN-012	DATE: 2/3/2015	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY: **GENERIC**	WORK TYPE: **Gauging & Sampling**	WORK ACTIVITY (Description): **Soil Sampling**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Michael Hodess	Staff Environmental Scientist	Mike Ritorto	Senior Hydrogeologist
		Leo Kurylo	IL-OHSM

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES ☒ FLAME RESISTANT CLOTHING (as needed)	☐ GOGGLES ☐ FACE SHIELD: ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Recommended Equipment: 42" traffic cones, caution tape, trowel

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A minimum 10' exclusion zone will be maintained around moving equipment, if present.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Secure location	1a. **CONTACT:** Personnel and vehicular traffic may enter the work area.	1a. If in an area with foot or vehicle traffic, delineate the work area with 42" traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity. 1a. Wear reflective vest and/or high visibility clothing. 1a. Face the direction of any vehicular traffic. Position vehicle to protect worker from traffic. 1a. Communicate work activity with adjacent work areas.
	1b. **FALL:** Tripping/falling due to uneven terrain or entry/exit from excavations.	1b. Inspect pathways and work area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions. 1b. Use established pathways and walk on stable, secure ground. 1b. Stage equipment and tools in a convenient, stable, and orderlymanner. Store equipment at lowest potential energy. 1b. Roux employees should stay 5 feet from in-progress excavations and trenches. Should entry to an excavation be appropriate (when stabilization is complete), ladders must be employed for steep embankments, excavations, pits, and trenches.
	1c. **EXPOSURE:** Exposure to sun and excessive heat, possibly causing sunburn, heat exhaustion or heat stroke. Exposure to cold temperatures possibly causing cold stress. Skin burn as a result of fire, if applicable. Exposure to explosive vapors due to tank farm operations, Biological hazards - ticks, bees/wasps, poison ivy, thorns, insects, etc.	1c. Wear sunscreen with an SPF 15 or greater whenever 30 minutes or more of exposure is expected. 1c. Use a tent to shade the work area from direct sunlight particularly when warm temperatures are expected. 1c. Be aware of the location of all Site personnel. 1c. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). 1c. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). 1c. Take breaks for rest and water as necessary. Move to an area that is well shaded or a climate controlled area (i.e., car, site trailer, etc.). 1c. No open flames/heat sources. 1c. Flame resistant clothing must be worn when specified by Site policy. 1c. Cell phones should be disabled when specified by Site policy. 1c. Pre-treat field clothing with Permethrin prior to site visit to kill/repel ticks and insects. 1c. Wear long sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin. 1c. Spray insect repellant containing DEET on exposed skin when working in overgrown areas of the Site. 1c. Inspect area to avoid contact with biological hazards. 1c. Wear cut-resistant gloves when handling branches, shrubs, etc. that may lie within the walking path. 1c. Personnel shall examine themselves and co-worker's outer clothing for ticks periodically when onsite. 1c. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water. If rash persists after washing, immediately notify your supervisor and the CHSM for possible consultation with a physician at an approved Occupational Health Clinic.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
2. Collect Soil Sample	2a. **CONTACT:** Personal injury from pinch points, cuts, and abrasions from sampling equipment tools, and material within soil sample. Personal injury from contact with moving equipment while sampling.	2a. Wear cut-resistant (i.e., Kevlar) gloves under chemical-resistant disposable gloves when handling soil samples and sampling jars. 2a. Where possible, use trowel or equivalent tool to avoid contact with soil. 2a. If sampling from bucket of heavy equipment, ensure all equipment is off and operator utilizes the "show me your hands" policy. 2a. See 1a.
	2b. EXPOSURE: Exposure to contamination (impacted soil) and/or lab preservatives.	2b. Wear chemical-resistant disposable gloves over cut resistant gloves to protect hands when handling samples; use containment material or plastic sheeting to protect surrounding areas. 2b. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground. 2b. Open sample jars slowly and fill carefully to avoid contact with preservatives.
3. Decontaminate equipment	3a. **EXPOSURE/CONTACT:** Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated vapors and/or soil).	3a. Wear chemical-resistant disposable gloves and safety glasses. 3a. Use an absorbent pad to clean spills. 3a. Properly dispose of used materials/PPE in provided drums in designated drum storage area. 3a. Remain upwind of sample and avoid breathing contaminant vapors, if they are present.
	3b. **EXPOSURE:** Chemicals in cleaning solution including ammonia.	3b. Wear chemical-resistant disposable gloves and safety glasses. 3b. Work on the upwind side of decon. area. 3b. Use an absorbent pad to clean spills. 3b. Properly dispose of used materials/PPE in provided drums in designated drum storage area.

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JOB SAFETY ANALYSIS	Ctrl. No. GEN 007	DATE: 2/3/2015	☐ NEW ☒ REVISED	PAGE 1 of 1
JSA TYPE CATEGORY **Generic**	WORK TYPE **O&M**	WORK ACTIVITY (Description) **Movement of 55-Gallon Drums/Drum Handling with Mobile Carrier**		

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Michael Smith	Senior Technician	Daniel Abberton	SHSM
		Ray Greenidge	Project Engineer

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Cut-resistant gloves
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER:
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING: Fluorescent sleeved shirt or sleeved shirt and reflective safety vest.	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel or composite toe		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Mobile Drum Carrier, safety cones, and caution tape

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A 10' exclusion zone will be maintained around forklift.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Secure Work Area, Inspect 55-gal drums for proper condition, labeling, check drum ring and bolts for tightness, inspect mobile drum carrier.	1a. **FALL:** Tripping/falling due to uneven surface terrain	1a. Inspect walking path for uneven terrain, weather-related hazards (i.e. debris, puddles, ice, etc.), and other obstructions prior to accessing work area. 1a. Use established pathways and walk on stable, secure ground. 1a. Secure work area and coordinate and communicate the planned work activities with other personnel working in the area. 1a. Delineate work area with 42" safety cones.
	1b. **CONTACT/EXPOSURE:** Drums could potentially be damaged and contain hazardous material. Mobil drum carrier could potentially not be in good working condition causing malfunctioning during operation.	1b. Prior to inspecting drums don cut-resistant gloves. If drum is not properly labeled, do not open and cease all drum transport activities. Immediately contact project manager and inform him/her of drum situation. 1b. Do not continue drum transport activities until further actions are determined by the project manager. 1b. If the drum is properly labeled, but leaking, improperly sealed or in poor condition, place drum in an over-pack drum. 1b. Inspect mobile drum carrier to ensure the overall integrity of the carrier. Look for rust marks or potential weak points where the drum carrier could malfunction. Inspect the wheels to ensure that they easily turn and nothing is impeding their movement.
	1c. **EXERTION/CAUGHT:** Potential pinching/exertion hazards while securing ring/ tightening bolts	1c. Keep back straight and knees slightly bent while securing drum ring/tightening bolt. Wear cut-resistant gloves.
2. Position drum clamp in between drum ribs, securing drum clamp to drum with chain	2. **CAUGHT:** Pinching fingers between drum clamp and handle/chain.	2. Attach drum clamp with chain and tighten until snug. Do not place hands between drum clamp and drum as the chain is tightened; wear cut resistant gloves.
3. Disengage safety latches on handle, pull handle down until drum is lifted off ground and safety latches are reengaged; slightly suspending drum off of the ground	3a. **EXERTION/ CONTACT:** Potential muscle strain associated with lifting/engaging drum/handle. Drum could shift/slip downward and crush toes.	3a. Ascertain whether the drum is overweight; if it is, then two people are needed to lower handle while drum is secured with clamp so that safety latches can be engaged. Keep body out of the line of fire of the handle (do not position head above handle) as it is being pushed down. Do not allow feet/toes to be positioned under the drum as it is being lifted; wear steel/composite toe boots.
	3b. **CAUGHT:** Fingers could be pinched while engaging/disengaging safety latches on handle	3b. Wear cut-resistant gloves while disengaging/reengaging safety latches.
4. Transport drums to designated location and disengage drum clamp (repeat Step 3 in reverse order)	4a. **FALL:** Tripping/ falling due to obstructions and uneven terrain. Potential for drum to fall during transport.	4a. Ensure transport path is free of potential obstructions that may cause the drum/carrier to become unstable. Position drum clamp between the ribs on the drum to prevent possible slipping.

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JOB SAFETY ANALYSIS	Cntrl#: GEN-015	DATE 1/27/15	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE:	WORK ACTIVITY (Description):	
GENERIC	**Drilling**	**Monitoring and Recovery Well Development**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Amy Hoffman	Staff Geologist	Mike Ritorto	Senior Hydrogeologist
Ron Lombino	Staff Geologist	Daniel Abberton	

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment as needed: Truck Rig or support truck, Trailer, 42 inch Safety cones and flags, Caution Tape, Interface Probe, Power Source, Submercible Pump, Surge Block/Plunger, 20 lb. Fire Extinguisher, Holding Tanks and/or Buckets, Tools as needed: Socket and Pipe Wrench, Screw Driver, Pry Bar, Ratchet, Vault Key.

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Maintain a 20 Foot Exclusion Zone During Development Activities

"SHOW ME YOUR HANDS"
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization / Demobilization (**Review Mobilization and Demobilization JSA**)	1a. **CONTACT:** Equipment/property damage.	1a. The truck rig's tower/derrick will be lowered and secured prior to mobilization. 1a. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers. 1a. All non-essential personnel should **maintain an exclusion zone of 20 feet**. 1a. Beep horn twice before backing up. 1a. When backing up with an attached trailer use a spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. Stay away from the line-of-fire. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed.
	1b. **FALL:** Slip/trip/fall hazards.	1b Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Store equipment at lowest potential energy.
2. Open/close well.	2a. **OVEREXERTION:** Muscle strain (some wells have large vault covers).	2a. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Two people are required when lifting objects over 50 lbs or when the shape makes the object difficult to lift.
	2b. **CAUGHT:** Pinch points associated with removing/replacing manholes and working with hand tools.	2b. Wear leather gloves when working with well vault/cover and hand tools. Do not put fingers under well vault/cover. 2b. Use ratchet and pry bar for well cover and inspect before use.
	2c. **EXPOSURE:** Potentially hazardous vapors.	2c. No open flames/heat sources. 2c. Allow well to vent after opening it and before starting development activities to minimize exposure to vapors. Air monitoring must be performed prior to set up and during the well development activities. Work on upwind side of well.
	2d. **CONTACT:** Traffic.	2d. Wear required PPE including high visibility clothing or reflective vest. 2d. Delineate work area with 42" safety cones and/or other barriers. Position vehicle to protect against oncoming traffic. 2d. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Develop well (mechanical surging).	3a. **CAUGHT:** Cut hazards and finger pinch points.	3a See 2b. 3a. Use required PPE including leather/cut-resistant gloves when handling development equipment. Identify finger/hand pinch points. Keep hands away from active surge equipment. 3a. All non-essential personnel should **maintain an exclusion zone of 20 feet**.
	3b. **CONTACT/EXPOSURE:** Contamination (e.g., SPH, contaminated groundwater, vapors).	3b. See 2c. 3b. Wear Nitrile gloves and safety glasses. Insert and remove surge block/plunger and line/cable slowly to avoid splashing at the surface. 3b. Use an absorbent pad to clean any spills.
	3c. **OVEREXERTION:** Muscle strain from lifting equipment.	3c. See 2a. 3c. Use mechanical device to insert and remove surge block/plunger if greater than 50lb.
	3d. **CONTACT:** Injury while handling wench line/cable, or with active surging equipment	3d. If using a drill rig, inspect all wench lines/cables for any kinks or if frayed prior to use. Replace any damaged lines/cables. Review **Drill Rig checklist prior to development activities**. 3d. See 3a.
4. Purging well (pumping water to holding tanks/drums/buckets).	4a. **CAUGHT:** Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses.	4a. See 3a. 4a. Ensure that fingers are not placed near coupling when attaching and securing hose(s). Do not place fingers under pump/hoses. Wear leather or cut-resistant gloves when handling pump/hose(s). 4a. Keep hands clear from any line of fire.
	4b. **FALL:** Using side mounted ladder when attaching hose to tank. Slip, trip, fall from lines/hoses	4b. Inspect ladder steps to make sure steps are not bent/damaged and free of debris/fluid. 4b. Use three points of contact at all times when using ladder. 4b. Utilize anti-whip cords on all compressed hoses. Keep hoses and lines coiled and organized out of designated walking paths around the work zone.
	4c. **CONTACT:** Contamination (e.g., SPH, contaminated groundwater).	4c. Secure water hose. 4c. Do not overfill tanks, and purge/transfer liquids in such a manner that they do not splash. (See 3b). 4c. Dispose of used materials/PPE in the designated impacted PPE container.
	4d. **EXERTION:** Muscle strain from lifting/carrying equipment.	4d. See 2a.
	4e.**FALL:** Spilled purge water.	4e. Clean up any spills using absorbent pads or spill kits.
5. Decontaminate equipment	5a. **CONTACT/EXPOSURE:** Contamination (e.g., SPH, contaminated groundwater, vapors).	5a. See 3b.
	5b. **EXPOSURE/CONTACT:** Chemicals in cleaning solution	5b. Decontaminate equipment in well-ventilated area. Wear nitrile gloves to avoid skin contact with cleaning solutions.

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JOB SAFETY ANALYSIS Ctrl. No. GEN-005	DATE 2/4/2015	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE:	WORK ACTIVITY (Description):
Generic	**Gauging and Sampling**	**Gauging and Sampling**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Gina Masciello	Project Scientist	Joe Gentile	Corp H&S Mgr
Louis Goldstein	Staff Engineer	Michael Ritorto	Project Hydrogeologist
		Louis Goldstein *(as part of annual review)*	Staff Engineer

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☒ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☐ HEARING PROTECTION ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Knee pads, Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

42-inch Safety Cones, Caution Tape, Interface Probe and/or Water Level Meter, 20-lb., Type ABC Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Screw Driver, Crow Bar, Mallet, and Wire Brush.

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization to monitoring well(s).	1a. **FALL:** Personal injury from slip/trip/fall due to uneven terrain and/or obstructions.	1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure ground and avoid steep hills or uneven terrain. 1a. If working near open water with an unguarded edge, wear life vest.
	1b. **CONTACT:** With traffic/third parties.	1b. Identify potential traffic sources and delineate work area with 42-inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.
	1c. **EXPOSURE:** To biological hazards.	1c. Inspect work area for bees and insects. 1c. Use insect/tick repellent as necessary.
2. Open/close well.	2a. **ERGNOMICS:** Muscle strain.	2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well.
	2b. **CAUGHT:** Pinch/crush points associated with removing/replacing manholes and working with hand tools.	2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar for well cover) and inspect before use. 2b. Do not put fingers under well cover.
	2c. **CAUGHT:** Pinch points associated with placing J-plug back onto PVC pipe.	2c. See 2b. 2c. Keep fingers out of line-of-fire when securing cap
	2d. **EXPOSURE:** To potential hazardous vapors.	2d. No open flames/heat sources. 2d. To minimize exposure to vapors allow well to vent after opening it and before sampling activities begin. 2d. Stand up-wind, if possible, to avoid vapors.
3. Gauge well.	3a. **CONTACT:** With contamination (e.g. contaminated groundwater).	3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe.
	3b. **CONTACT:** With traffic.	3b. See 1b.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
4. Purge and sample well.	4a. **EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives.	4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives. 4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling. 4a. Fill sample containers over purge container to avoid spilling water onto the ground. 4a. Use an absorbent pad to clean spills. 4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards. 4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater. 4a. When using a tubing valve always remove the valve slowly after sample collection to release any pressure and avoid pressurized splash hazards 4a. When collecting a groundwater sample always point sampling apparatus (tubing, bailer, etc.) away from face and body.
4. Purge and sample well (Continued).	4b. **CONTACT:** Personal injury from cuts, abrasions, or punctures by glassware or sharp objects. 4c. **ERGONOMICS:** Muscle strain while carrying equipment. 4d. **CONTACT:** With traffic. 4e. **CONTACT**: Pinch points with groundwater pump components (i.e. wheel, line, clamps) 4f. **ERGONOMICS**: Muscle strain from repetitive motion of bailing and sampling a well	4b. To avoid spills or breakage, place sample ware on even surface. 4b. Do not over tighten caps on glass sample ware. 4b. Wear chemical-resistant nitrile disposable gloves over cut-resistant (i.e. Kevlar) gloves when sampling and handling glassware (i.e., VOA vials) or when using cutting tools. 4c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier. 4c. Make multiple trips to carry equipment. 4d. See 1b. 4e. Wear leather gloves when working with groundwater pumps 4e. Never place hands on or near pinch points such as the wheel, clamps or other moving parts during pump operations 4e. Use correct the correct mechanisms, such as a pump reel, to lower pump into well 4e. Never attempt to manually stop any moving part of equipment including hose reels and/or tubing. 4f. See 4c. 4f. Include a stretch break when repetitive motions are part of the task.
5. Management of purge water.	5a. **EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). 5b. **ERGONOMICS:** Muscle strain from lifting/carrying and moving containers.	5a. Do not overfill container and pour liquids slowly so that they do not splash. 5a. Properly dispose of used materials/PPE in appropriate container in designated storage area. 5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.). 5b. Do not overfill container(s).
6. Decontaminate equipment.	6a. **EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). 6b. **CAUGHT:** Pinch points associated with handling hand tools	6a. Work on the upwind side, where possible, of decon area. 6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. Use an absorbent pad to clean spills. 6b. See 2b. 6b. Inspect hand tools for sharp edges before decontaminating

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JOB SAFETY ANALYSIS	Ctrl. No. GEN-013	DATE: 01/16/2015	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Gauging and Sampling**	**Soil Vapor Sampling (Permanent Monitoring Points)**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Jeff Wills	Project Hydrogeologist	Daniel Abberton	SHSM
		Mike Ritorto	Senior Hydrogeologist
		Julie Moriarity	Staff Scientist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Cut-resistant & Nitriles
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☒ OTHER: Bug Spray, Sun Screen, Knee Pads or kneeling pad
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel-toe boots		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

9/16" Socket and Wrench, Non-Toxic Clay, Teflon-Lined Tubing, Masterflex Tubing, 3-Way Stopcock, Air Pump with Low Flow, Dry Cal, Enclosure (Bucket with 2 holes), Helium Gas Canister, Summa Canisters and Flow Controllers, MultiRae Gas Meters, CO2/O2 Meters, Helium Detector, Tubing Cutter, 42-inch Safety Cones, Caution Tape or Retractable Cone Bars

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Exclusion Zone: Maintain a 5-Foot Exclusion Zone for Non-Essential Personnel

ACCESS [1]JOB STEPS	ANALYZE [2]POTENTIAL HAZARDS	ACT [3]CRITICAL ACTIONS
1. Define and secure work area.	1a. **FALL:** Potential tripping hazards.	1a. Ensure work area is secure and inform others (third party) of work activity. 1a. Remove tripping hazards and inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.
	1b. **CONTACT:** Potential contact with moving vehicles or pedestrians.	1b. If working alongside roads, look both ways before entering roadways, face traffic, and utilize work vehicle to protect employees. 1b. Delineate work area (including vehicles) with traffic safety cones and caution tape or retractable cone bars. 1b. Maintain a 5 foot exclusion zone. 1b. Wear high visibility clothing or reflective safety vest.
	1c. **OVEREXERTION:** Muscle strain while lifting and carrying equipment.	1c. When carrying equipment to/from work area, keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced. Use mechanical assistance/make multiple trips to carry equipment.
2. Remove well cover / close well cover.	2a. **CONTACT/CAUGHT:** Pinch points and scrapes associated with hand tools and well covers.	2a. Keep hands away from pinch points. 2a. Use hand tools with extensions to remove and replace well covers. 2a. Wear cut-resistant gloves. 2a. Use knee pads or kneeling mat when repetitive kneeling on rough ground is anticipated.
	2b. **FALL:** Potential tripping hazards associated with installing bolts.	2b. Place security bolts in secure location so not to create tripping hazards. Replace security bolts so that they fit flush with monitoring well covers.
	2c. **OVEREXERTION:** Physical exertion to remove bolts that were over torque or stripped.	2c. Replace any security bolts that show signs of stripping. Do not over tighten. 2c. Use body positioning and bending techniques that minimize muscle strain; keep back straight, bend at the knees. 2c. See 2a.
3. Remove / replace brass caps at the end of the sample tubing.	3a. **CONTACT:** Pinch points associated with hand tools and brass caps.	3a. Use wrench to remove and replace brass caps. 3a. Wear cut-resistant gloves to protect against pinch points and scrapes.
	3b. **EXPOSURE:** Potential pathway for vapors to migrate to land surface.	3b. Replace brass caps immediately upon completion to avoid soil vapors migrating to the surface through sample tubing. 3b. Stand up wind of sample point location.

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ACCESS [1]JOB STEPS	ANALYZE [2]POTENTIAL HAZARDS	ACT [3]CRITICAL ACTIONS
4. Set up soil vapor sampling equipment and calibration of meters.	4a. **FALL:** Potential tripping hazards associated with equipment and tubing.	4a. Place equipment in one area close to the sampling location. 4a. Keep tubing slack to a minimum and locate the summa canister as close to the sampling location as possible. 4a. Avoid stepping over equipment and tubing.
	4b. **CONTACT:** Pinch points associated with handling equipment.	4b. Do not place fingers/hands under sampling equipment. 4b. Make multiple trips when unloading equipment in work area. 4b. Wear cut-resistant gloves to protect against pinch points while handling sampling equipment.
	4c. **EXPOSURE:** Inhalation of calibration gas and helium.	4c. Review SDS for each type of calibration gas used before calibrating. 4c. Calibrate meters in a well vented area and keep air flow regulator away from face. 4c. Close valve on canisters after use to avoid inhalation of excess helium or calibration gas. 4c. Stand up wind of bucket during helium tracer gas test.
5. Screen sample tubing with multiple gas and CO_2/O_2 meters.	5a. **FALL:** Potential tripping hazards associated with equipment.	5a. See 4a 5a. Identify area where equipment is to be stored within the work area (away from main walking path). 5a. Don't leave equipment on the ground. Return equipment to storage area between uses.
	5b. **EXPOSURE:** Inhalation of soil vapor	5b. See 3b. 5b. Use master flex to connect tubing to meter. 5b. Stand on opposite side of meter vent and upwind of soil vapor point during screening activities.
6. Cleaning Work Area.	6a. **FALL:** Potential tripping hazards associated with equipment and tubing.	6a. See 4a. 6a. See 5a.
	6b. **CONTACT:** Storing and transport of equipment in car.	6b. Ensure that equipment is placed securely in the vehicle. Do not stack equipment on top of each other. Secure equipment so that it will not slide while being transported. 6b. Wear cut-resistant gloves while handling/loading equipment.

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JOB SAFETY ANALYSIS	Ctrl. No. GEN-006	DATE 5/14/2015	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
Generic	**Surveying**	**Elevation Surveying**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Mark M Emmons	Project Engineer	Daniel Abberton	Health and Safety Officer
Bjorn Wespestad	Senior Engineer	Michael Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Cut-resistant or leather
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☒ OTHER: Long sleeve Shirt
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel-toe boots		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Surveying equipment (i.e., leveling rod/measuring ruler, tripod and scope).

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Check in with Site manager/ property owner.	**1a. CONTACT/EXPOSURE/FALL:** Lack of communication could result in H&S incident.	1a. Inform Site personnel of work scope, timeline and location(s). 1a. Inquire about other activities taking place at the Site. 1a. If applicable, obtain General Work permit for the day.
2. Locate surveying position for instrument and rod and set-up work area	2a. **FALL:** Slip/trip hazards.	2a. Inspect area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to setting up at the survey location. Keep eyes engaged with walking surface while in movement. Remember " Walking is Working" 2a. Conduct housekeeping and maintain clear paths to walk in and remove debris as required.
	2b. **CONTACT:** Traffic (surveying locations could potentially be located in parking areas and sidewalks).	2b. Be aware of oncoming traffic. Utilize a flagman / spotter for locations in streets or high-traffic areas. 2b. Place 42 inch cones around the work area, and delineate work zone with caution tape ,snow fencing or safety bars, if necessary. 2b. Wear appropriate PPE including long sleeve high visibility clothing and or reflective safety vest. 2b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.
	2c. **OVEREXERTION:** Hazard due to carrying, lifting, and bending while transporting equipment.	2c. Use proper body positioning and lifting techniques; keep back straight, lift with legs, keep load close to body, and never reach with a load. 2c. Avoid carrying too much equipment at one time and team-lift equipment that is more than 50 lb.
	2d. **CAUGHT/CONTACT:** Pinch Points / sharp edges associated with setting up the tripod.	2d. Wear cut resistant gloves when handling the tripod and keep fingers away from pinch points located near moving parts of the tripod. Don't carry tripod by the pointed ends.
3. Open / close manhole cover to well that is being surveyed (if necessary).	3a. **OVEREXERTION:** Muscle strain	3a. See 1c. Bend knees when reaching to open well. Use manhole lifting hook or pry bar to avoid bending.
	3b. **CAUGHT:** Pinch points associated with removing / replacing manholes and working with hand tools.	3b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 3b. Use proper tools (ratchet and crowbar or pry bar for well cover) and inspect before use. 3b. Do not put fingers under well cover.
	3c. **EXPOSURE:** To potentially hazardous vapors. To biological hazards.	3c. No open flames/heat sources. 3c. To minimize exposure to vapors allow well to vent after opening it and before survey activities begin. 3c. Work on the upwind side of manhole/well. 3.c Use caution while opening up lids to inspect work area for bees and insects inside of covers. 3c. Use insect/tick repellent as necessary.
	3d. **CONTACT:** With traffic.	3d. See 2b.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
4. Perform survey.	4a. **FALL:** Slip/trip hazards 4b. **CONTACT:** Traffic (surveying locations could be potentially located in parking areas and sidewalks)	4a. See 2a. 4b. See 2b. 4b. Personnel using the scope will be devoting most of their attention to the surveying activity and shall be aware of vehicular and pedestrian traffic. Personnel holding the measuring stick should be extra vigilant of survey personnel and communicate any potential hazards to the instrument person via handheld radio or similar means. Ensure reflective safety vest is worn.
5. Break down work area.	5a. **CONTACT:** Traffic (surveying locations can potentially be located in parking areas and sidewalks). 5b. **EXERTION:** Hazard due to carrying, lifting, and bending while transporting equipment	5a. See 2b. 5b. See 2c.

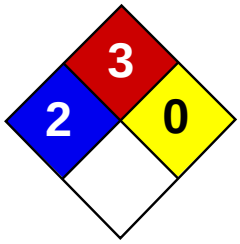
[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

[2] A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

APPENDIX B

Hazard Communication MSDS /
SDS for Chemicals Used



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 powferful 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 powferful 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, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful 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.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

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

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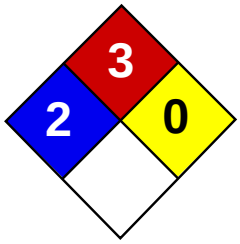

Health	2
Fire	3
Reactivity	0
Personal Protection	H

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(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: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. 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, Hypophostatemia), 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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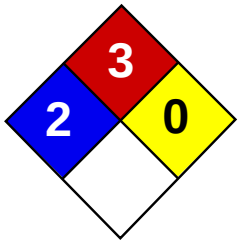

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

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
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to 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. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

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. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

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.

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. Slightly explosive in presence of heat.

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:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

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 away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. 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:
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). Sensitive to light. Store in light-resistant containers.

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: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

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

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

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: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

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). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

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:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

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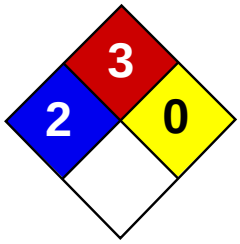

Material Safety Data Sheet
Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C6H4(CH3)2

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
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 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, liver, mucous membranes, bone marrow, 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 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. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

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. 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. Slightly explosive in presence of open flames and sparks, of heat.

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. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:
Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

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 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, 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: 100 (ppm) [Canada] TWA: 435 (mg/m3) [Canada] TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States] TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

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

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

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: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

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): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and femael fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/ kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may alsocause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

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: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Xylenes Illinois chemical safety act: Xylenes New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes Pennsylvania RTK: Xylenes Minnesota: Xylenes Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes California Director's List of Hazardous Substances: Xylenes TSCA 8(b) inventory: Xylenes SARA 302/304/311/312 hazardous chemicals: Xylenes SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 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-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):
R10- Flammable. R21- Harmful in contact with skin. R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

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.

Created: 10/11/2005 12:54 PM

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

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MATERIAL SAFETY DATA SHEET

SECTION 1 ◆ PRODUCT AND COMPANY IDENTIFICATION

Explorer Pipeline Company 6846 South Canton P.O. Box 2650 Tulsa, Oklahoma 74101	**FOR EMERGENCY SOURCE INFORMATION CONTACT:** ➢ (918) 493 - 5100 ➢ CHEMTREC: (800) 424-9300 (24 hour contact) ➢ CANUTEC: (613) 996-6666 ➢ SETIQ: 91-800-00214

TRADE NAMES/SYNONYMS: Methyl Tertiary Butyl Ether, Methyl Ether, Butyl Ether, or MTBE	**CHEMICAL FAMILY:** Alkyl Ethyl	**EPL Code:** 17

This material safety data sheet represents the composite characteristics and properties of fungible petroleum hydrocarbons and other related substances transported by explorer pipeline company. The information presented was compiled from one or more product shipper sources and is intended to provide health and safety guidance for these fungible products. Individual shipper and manufacturer MSDSs are available at Explorer Pipeline Company's, Tulsa, Oklahoma, offices.

SECTION 2 ✱ HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER! EXTREMELY FLAMMABLE LIQUID

- Clear, colorless liquid with ether-like odor;
- Eye and mucous membrane irritant - effects central Nervous system - harmful or fatal if swallowed - aspiration hazard;
- High fire hazard. Keep away from heat, spark, open flame, and other ignition sources;
- Contact may cause eye, skin and mucous membrane irritation. Avoid prolonged breathing of vapors or mists;
- Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects;
- If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs); and
- Obtain prompt medical attention. Keep Out of Reach of Children!

SECTION 3 ▼ COMPOSITION/INFORMATION OF INGREDIENTS

INGREDIENT	CAS NUMBER	PERCENTAGE (%)
Methyl Tertiary Butyl Ether	1634-04-4	97+%

ACUTE

GETTING IT IN YOUR EYE...

- May cause minor eye irritation.

GETTING IT ON YOUR SKIN...

- No significant signs or symptoms indicative of any health hazard are expected to occur as a result of skin absorption exposure.
- May produce skin irritation.

SWALLOWING IT...

- The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

BREATHING IT...

- Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

CHRONIC

- Medical information regarding special health effects is not conclusive.

CANCER, REPRODUCTIVE AND GENETIC EFFECTS

- This product has produced cancer, developmental and systemic toxicity in laboratory animals following repeated exposure. The significance of these results to human exposures has not been determined.

See Toxicological Information (Section 11) For More Information

SECTION 4 ✣ FIRST AID MEASURES

EYES: In case of eye contact, immediately rinse with clean water for 20-30 minutes. Retract eyelids often. Obtain emergency medical attention if pain, blinking, tears or redness persist.

SKIN: Immediately remove contaminated clothing. Wash skin thoroughly with mild soap/water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first.

INGESTION: If large quantity swallowed, give lukewarm water (pint) if victim completely conscious/alert. Do not induce vomiting/risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.

INHALATION: If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain emergency medical attention. Prompt action is essential.

NOTE TO PHYSICIAN: TREAT SYMPTOMATICALLY AND SUPPORTIVELY

SECTION 5 ⌘ FIRE FIGHTING MEASURES

Releases flammable vapors below normal ambient temperatures. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Flammable vapors may be heavier than air. May travel long distances along ground before igniting/flashing back to vapor source.

FLASH POINT:(Method Used) -30°F	**FLAMMABLE LIMITS:** LEL: 1.0% UEL: 8.0%

AUTOIGNITION TEMPERATURE: 797°F

EXTINGUISHING MEDIA: Dry Chemical, CO_2, Foam for Alcohols, Water spray, and fog to cool exposures

HAZARDOUS REACTIONS/DECOMPOSITION: Combustion may produce carbon monoxide, carbon dioxide, and acrid fumes. Incomplete combustion generates highly poisonous carbon monoxide and perhaps other toxic gases.

SPECIAL INSTRUCTIONS: Do not enter fire area without proper protection. Decomposition products possible. Fight fires from safe distance/protected location. Heat may build pressure/rupture closed containers, spreading fire, increasing risk of burns/injuries. Water may be ineffective due to low flash point. Even if material is water soluble, may not be practicable to extinguish fire by water dilution. Apply water spray/fog for cooling. Notify authorities if liquid enters sewer/public waters.

SECTION 6 ❖ ACCIDENTAL RELEASE MEASURES

- Flammable liquid. Release can cause fire/explosion. Liquids/vapors may ignite. Evacuate/limit access. Equip responders with proper protection. Kill all ignition sources. Stop release. Prevent flow to sewers/public waters. Notify fire/environmental authorities. Blanket with firefighting foam. Restrict water use for cleanup. Impound/recover large land spill. Soak up small spill with inert solids. Use suitable disposal containers. On water material partially soluble/may float or sink. Contain/minimize dispersion/collect. Disperse residue to reduce aquatic harm.

SECTION 7 ⚹ HANDLING AND STORAGE

Prior to working with this product workers should be trained on its proper handling and storage

- Store in tightly closed/properly vented containers away from heat/sparks/open flame/strong oxidizers. Use only non-sparking tools. Store drums with bung in up position. Carefully vent internal pressure before removing closure. Containers must be grounded before transfer. Electrical equipment should conform to National Electric Code. Handle used containers with care; residue may be flammable/explosive, unless blanketed with inert gas.
- Isolate, vent, drain, wash, and purge equipment before maintenance. Remove all ignition sources, check atmosphere for explosiveness and oxygen deficiencies. Use adequate personal protective equipment. Observe precautions pertaining to confined space entry.

SECTION 8 ⊕ EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: No special ventilation is usually required beyond that needed for normal comfort control.

OTHER HYGIENIC AND WORK PRACTICES: Emergency eye wash fountains and safety showers should be available in the immediate vicinity or any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse. Shower after work using plenty of soap and water.

EXPOSURE LIMITS

OSHA PEL		ACGIH TLV (2005)	
METHYL TERT BUTYL ETHER			
TWA	STEL	TWA	STEL
Not Applicable (N.A.)	N.A.	50 ppm	N.A.

PERSONAL PROTECTIVE EQUIPMENT

- **EYES:** Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapor. Contact lenses should not be worn.
- **SKIN:** Depending on the conditions of use, protective gloves, apron, boots, head and face protection should be worn. This equipment should be cleaned thoroughly after each use.
- **RESPIRATORY PROTECTION:** No occupational exposure standards have been developed for this material. Where exposure through inhalation may occur from use, NIOSH/MSHA approved respiratory protection is recommended.

SECTION 9 ϟ PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (760 MM HG): 131°F	**PERCENT VOLATILE BY VOLUME:** 100%
SPECIFIC GRAVITY (H_2O = 1): 0.74 @ 68°F	**VISCOSITY UNITS, TEMP:** No Data
FREEZING POINT: -164°F	**VAPOR DENSITY (AIR =1):** 3.1
VAPOR PRESSURE AT 68°F: 75 mm Hg	**SOLUBILITY IN WATER:** Approximately 4% to 5%
APPEARANCE AND ODOR: Clear, colorless liquid with ether-like odor.	

SECTION 10 ¤ STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable

CONDITIONS TO AVOID: High temperature, open flame or spark.

OTHER PHYSICAL AND CHEMICAL PROPERTIES: No Data

MATERIALS TO AVOID: Strong oxidizing agents, ungrounded electrical equipment, open flames and spark.

HAZARDOUS POLYMERIZATION: Not Expected to Occur

SECTION 11 ֍ TOXICOLOGICAL INFORMATION

METHYL TERT BUTYL ETHER (MTBE)

Acute symptoms associated with human exposure to MTBE appear to be mild and transient. Breathing small amounts of MTBE for short periods may cause nose and throat irritation. In laboratory studies, rodents exposed to high doses of MTBE exhibited blood chemistry changes and liver and kidney abnormalities.

TOXICITY

Type Of Dose	Specie	Result	Type Of Dose	Specie	Result	Type Of Dose	Specie	Result
$LD_{50(oral)}$	Mouse	3,500 mg/kg	$LC_{50(inh)}$	Mouse	35,000 ppm	$LD_{LO(oral)}$	Human	No Data Available

CARCINOGENICITY

IARC	Sufficient evidence in animals	Inadequate evidence in humans	Group 3: Possible human carcinogen
NTP	Not identified as a Know Carcinogen or Anticipated Human Carcinogen		

California (Prop 65): Listed as carcinogen	NIOSH: Not Listed	ACGIH: A3 – Confirmed Animal	OSHA: not classifiable as a human carcinogen

MUTAGENICITY, TERATOGENICITY AND REPRODUCTIVE EFFECTS

In laboratory studies, MTBE vapor exposure at the high dose concentration was associated with an increased incidence of liver tumors in female mice. Also, at high dose concentration exposures, MTBE was associated with an increased incidence of kidney and testicular (Leydig cell) tumors in male rats. There is no evidence that MTBE causes cancer in humans.

SECTION 12 ❋ ECOLOGICAL INFORMATION

ACUTE EFFECTS: MTBE is considered moderately toxicity to aquatic life. Insufficient data are available to evaluate or predict the short-term effects to birds or land animals.

CHRONIC EFFECTS: MTBE is considered moderately toxicity to aquatic life. Insufficient data are available to evaluate or predict the long-term effects to birds or land animals.

DISTRIBUTION AND PERSISTENCE IN THE ENVIRONMENT: MTBE evaporates when exposed to air. It dissolves when mixed with water. Most direct releases of MTBE to the environment are to air. MTBE also evaporates from water and soil exposed to air. Once in air, it is expected to break down to other chemicals. Because it is a liquid that does not bind well to soil, MTBE that makes its way into the ground can move through the ground and enter groundwater. Plants and animals are not likely to store methyl tertiary-butyl ether..

SECTION 13 ✣ DISPOSAL CONSIDERATIONS

Contaminated product/soil/water may be RCRA/OSHA hazardous waste due to low flash point. Use registered transporters. Dilute aqueous waste may biodegrade.

SECTION 14 ★ TRANSPORTATION INFORMATION

Not Meant To Be All Inclusive - Check Local, State, And Federal Laws And Regulations

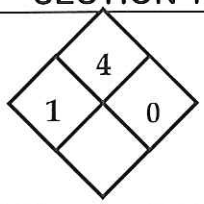
Agency	Shipping Name	Packing Group	Hazard Class	UN/NA #
U.S. DOT	Methyl tert-butyl ether	II	Flammable Liquid	UN 2398

SECTION 15 ☽ REGULATORY INFORMATION

CERCLA RQ's (40 CFR Part 302)	MTBE - 1,000 pounds
RCRA	Not Listed
SARA (40 CFR Part 355) TPQ's	None of the ingredients are listed
SARA Title III Section 313	All ingredients listed
California's Prop 65	All ingredients listed
OSHA	All ingredients are listed as hazardous under 29 CFR 1910.1200

SECTION 16 ❁ OTHER INFORMATION

NFPA 704 LABEL:



HMIS LABEL

1-4-0

MSDS REVISIONS: Change in Format and update of Information

MSDS CREATION DATE: July 1997 | **REVISION #1:** 01/03/06

DISCLAIMER

The information in this MSDS was obtained from sources which we believe are reliable. **HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS ACCURACY.** Some conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. **FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.** All product measurements such as flash point, *etc.* are considered approximate values. All data provided by Explorer Pipeline Company.

This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, such as refined petroleum hydrocarbon mixtures, this MSDS information may not be applicable.

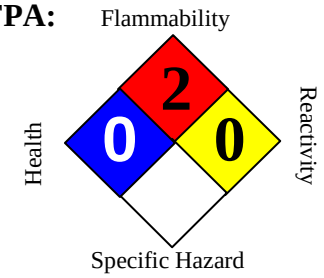
MSDS DEVELOPER: Cass Willard

Cass Willard, CIH

DATE: 01/03/06

Material Safety Data Sheet
Fuel Oil

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Fuel Oil
Synonyms	:	Bunkers, Black Fuel Oil, MFO, Industrial Fuel Oil, 6 Oil, Slurry Fuel Oil, RFO, Refinery Fuel Oil, High Sulfur Fuel Oil, HSFO, IFO-30, IFO-180, IFO-380, IFO-510, IFO-700, Bunker C, Bunker Fuel Oil, Marine Fuel Oil, Decant Oil, Utility Fuel Oil, LSFO, Six Oil, 888100008793
SDS Number	:	888100008793 **Version** : 1.20
Product Use Description	:	Fuel, Intermediate Stream
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259
Tesoro Call Center	:	(877) 783-7676 **Chemtrec (Emergency Contact)** : (800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications

Flammable Liquid – Category 4
Carcinogenicity – Category 1B
Toxic to Reproduction – Category 1B
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Acute Toxicity – Inhalation – Category 4
Acute Aquatic Toxicity– Category 3

Pictograms

Signal Word

DANGER

Hazard Statements

Combustible liquid.
May cause cancer from prolonged and repeated skin contact.
May damage fertility or the unborn child.
May cause damage to liver, kidney and nervous system through prolonged or repeated exposure.
Harmful if inhaled.
Harmful to aquatic life
Skin and eye irritant.
May contain and release toxic hydrogen sulfide (H2S) gas.

Precautionary Statements

Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from flames and hot surfaces. No smoking. Wear gloves, eye protection and face protection as needed to prevent skin and eye contact with liquid. Wash hands or liquid-contacted skin thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe vapors or mists. Use only outdoors or in a well-ventilated area
Response	In case of fire: Use dry chemical, CO2, water spray or fire fighting foam to extinguish. Get medical advice or attention if you feel unwell, are exposed, or become concerned. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin or eye irritation persists, get medical attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call or doctor or emergency medical provider
Storage	Store in a well ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.
Disposal	Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil	64741-62-4	100%
Polycyclic aromatic compounds (PACs or PNAs)		Typically 1.5%
Benzo[a]pyrene; Benzo[def]chrysene	50-32-8	Trace to 0.2%
Hydrogen Sulfide	7783-06-4	Trace to 0.2%
Sulfur (for waters within 25 miles of California shores)	17704-34-9	Trace to 0.1%
Sulfur (for waters within 200 miles of American shores)	17704-34-9	Trace to 1.0%
Sulfur (for International waters)	17704-34-9	Trace to 3.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Give oxygen. If breathing is irregular or stopped, administer artificial respiration. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap

		and plenty of water. Wash contaminated clothing before re-use. If skin irritation persists, call a physician.
Eye contact	:	Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If eye irritation persists, consult a specialist.
Ingestion	:	Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.
Notes to physician	:	Symptoms: Dizziness, Discomfort, Headache, Nausea, Disorder, Vomiting, Liver disorders, Kidney disorders, Aspiration may cause pulmonary edema and pneumonitis.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Carbon dioxide (CO2), Water spray, Dry chemical, Foam, Keep containers and surroundings cool with water spray.
Specific hazards during fire fighting	:	Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.
Special protective equipment for fire-fighters	:	Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.
Further information	:	Flammable vapor production at ambient temperature in the open is expected to be minimal, as the material is generally wet. However, depending on oil content and conditions, it is possible flammable vapors could accumulate in the headspace of storage containers, presenting a flammability and explosion hazard. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.
Environmental precautions	:	Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material.
Methods for cleaning up	:	Take up with sand or oil absorbing materials. Carefully vacuum, shovel, scoop or sweep up into a waste container for reclamation or disposal.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling	:	Keep away from fire, sparks and heated surfaces. No smoking near areas where

material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.
(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).
(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Conditions for storage, including any incompatabilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

No decomposition if stored and applied as directed.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Polycyclic aromatic compounds (or coal tar pitch volatiles – benzene soluble)		PEL	0.2 mg/m3
	Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil	64741-62-4	PEL	5 mg/m3 (as mineral oil mist)
	Hydrogen Sulfide	7783-06-4	STEL	20 ppm
ACGIH	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

	Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil	64741-62-4	TWA	0.2 mg/m3 (as mineral oil) Sum of 15 NTP-listed polynuclear aromatic hydrocarbons 0.005 mg/m3
	Polycyclic aromatic compounds (or coal tar pitch volatiles – benzene soluble)		TWA	0.2 mg/m3

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Work / Hygiene practices : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Dark green to brown or black liquid

Odor Petroleum asphalt odor

Odor threshold	No data available
pH	Not applicable
Melting point/freezing point	32° - 80°C (89.6° - 176°F)
Initial boiling point & range	154 - 372 °C (310° - 702 °F)
Flash point	60°C (140°F) minimum
Evaporation rate	Higher initially and declining as lighter components evaporate
Flammability (solid, gas)	Flammable vapor released by heated liquid
Upper explosive limit	No data available
Lower explosive limit	No data available
Vapor pressure	210 Pa at 25°C
Vapor density (air = 1)	>5
Relative density (water = 1)	>0.9 to 1.2 g/mL
Solubility (in water)	6 to 1400 mg/L at 25°C
Partition coefficient (n-octanol/water)	3.4 to 5 as log Pow at 25°C
Auto-ignition temperature	>176°C (>350 °F)
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	>300 cST typical at 40°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Vapors may form explosive mixtures with air. Hazardous polymerization does not occur.
Chemical Stability		Stable under normal conditions.
Possibility of hazardous reactions		Can react with strong oxidizing agents and peroxides. Keep away from strong acids and bases.
Conditions to avoid		Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers.
Hazardous decomposition products		Carbon monoxide, carbon dioxide and noncombusted hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	:	Because of its low vapor pressure, this product presents a minimal inhalation hazard at ambient temperature. Upon heating, fumes may be evolved. Inhalation of fumes or mist may result in respiratory tract irritation and central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract

irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Skin irritation

May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Exposure may cause a phototoxicity reaction: liquid or mist on the skin may produce a painful sunburn reaction when exposed to sunlight. Product may be hot which could cause 1st, 2nd, or 3rd degree thermal burns.

Eye irritation

May cause irritation, experienced as mild discomfort and seen as slight excess redness of the eye.

Ingestion

This material has a low order of acute toxicity. If large quantities are ingested, nausea, vomiting and diarrhea may result. Ingestion may also cause effects similar to inhalation of the product. Could present an aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death.

Further information

This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Studies have shown that similar products produce skin cancer or skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation. The presence of carcinogenic PNAs indicates that precautions should be taken to minimize repeated and prolonged inhalation of fumes or mists. Dermal application of gas oil to rats resulted in limited evidence of liver damage (i.e., increased liver weight and changes in hepatic serum enzyme activity) and bone marrow toxicity (hypoplasia and decreased hemoglobin.) Petroleum industry experience indicates that a program providing for good personal hygiene, proper use of personal protective equipment, and minimizing the repeated and prolonged exposure to liquids and fumes, is effective in reducing or eliminating the carcinogenic risk of high boiling aromatic oils (polynuclear aromatic hydrocarbons) to humans.
Liver and kidney injuries may occur.
Components of the product may affect the nervous system.

Component:

Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil	64741-62-4	Acute oral toxicity: LD50 rat Dose: 4,320 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Carcinogenicity: Animal experiments showed a statistically significant number of tumors.

Carcinogenicity

NTP	Benzo[a]pyrene; Benzo[def]chrysene (CAS-No.: 50-32-8)
IARC	Benzo[a]pyrene; Benzo[def]chrysene (CAS-No.: 50-32-8)
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause cancer. Benzo[a]pyrene; Benzo[def]chrysene (CAS-No.: 50-32-8)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	:	Not regulated if shipped below 140°F (60°C) Elevated temperature liquid, flammable (if shipped above 140°F (60°C)).
UN-No.	:	Not regulated if shipped below 140°F (60°C) 3256 if shipped above 140°F (60°C)
Class	:	9
Packing group	:	III
Hazard inducer	:	(Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil)

TDG

Proper shipping name	:	Not regulated if shipped below 140°F (60°C) Elevated temperature liquid, flammable (if shipped above 140°F (60°C)).
UN-No.	:	Not regulated if shipped below 140°F (60°C) 3256 if shipped above 140°F (60°C)
Class	:	9
Packing group	:	III
Hazard inducer	:	(Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil)

IATA Cargo Transport

UN-No.	:	Not regulated if shipped below 140°F (60°C) 3256 if shipped above 140°F (60°C)
Class	:	Not regulated if shipped below 140°F (60°c) Not permitted for transport (at 140°F (60°C) or higher temperature) 9

IATA Passenger Transport

UN-No.	:	Not regulated if shipped below 140°F (60°C) 3256 if shipped above 140°F (60°C)
Class	:	Not regulated if shipped below 140°F (60°c) Not permitted for transport (at 140°F (60°C) or higher temperature) 9

IMDG-Code

UN-No.	:	Not regulated if shipped below 140°F (60°C) 3256 if shipped above 140°F (60°C)
Description of the goods	:	Elevated temperature liquid, n.o.s. (Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil)
Class	:	Not regulated if shipped below 140°F (60°c) Not permitted for transport (at 140°F (60°C) or higher temperature) 9
Packaging group	:	III
IMDG-Labels	:	9
EmS Number	:	F-A S-P
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

TSCA Status	:	On TSCA Inventory
DSL Status	:	All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard Chronic Health Hazard

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Benzo[a]pyrene; Benzo[def]chrysene	50-32-8

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil	64741-62-4
Benzo[a]pyrene; Benzo[def]chrysene	50-32-8

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzo[a]pyrene; Benzo[def]chrysene	50-32-8

NJ RTK US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Clarified oils (petroleum), catalytic cracked; Heavy Fuel oil	64741-62-4
Benzo[a]pyrene; Benzo[def]chrysene	50-32-8

California Prop. 65 : WARNING! This product contains a chemical known in the State of California to cause cancer.

Benzo[a]pyrene; Benzo[def]chrysene	50-32-8

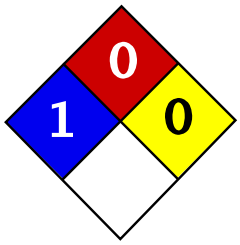
SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 07/26/2012

65, 66, 121, 295, 296, 347, 1003, 1006, 1007, 1009, 1010, 1022, 1054, 1083, 1084, 1085, 1089, 1586, 1886



Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

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
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator).
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to blood, kidneys, 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 if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

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: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

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:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

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. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. 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. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

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: Safety glasses. 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:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States]
TWA: 0.05 (mg/m3) from OSHA (PEL) [United States]
TWA: 0.03 (mg/m3) from NIOSH [United States]
TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

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

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials.
Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.
May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

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:
Acute Potential:
Skin:
Lead metal granules or dust: May cause skin irritation by mechanical action.
Lead metal foil, shot or sheets: Not likely to cause skin irritation
Eyes:
Lead metal granules or dust: Can irritate eyes by mechanical action.

Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation.
Inhalation:
In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes.
Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death.
Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count.
Ingestion:
Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases.
Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

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: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

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: Lead
California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead
California prop. 65: This product contains the following ingredients for which the State of California has found to

cause reproductive harm (male) which would require a warning under the statute: Lead
California prop. 65 (no significant risk level): Lead: 0.0005 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: Lead
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: Lead
Connecticut hazardous material survey.: Lead
Illinois toxic substances disclosure to employee act: Lead
Illinois chemical safety act: Lead
New York release reporting list: Lead
Rhode Island RTK hazardous substances: Lead
Pennsylvania RTK: Lead

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 D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed.
R33- Danger of cumulative effects.
R61- May cause harm to the unborn child.
R62- Possible risk of impaired fertility.
S36/37- Wear suitable protective clothing and gloves.
S44- If you feel unwell, seek medical advice (show the label when possible).
S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 1

Flammability: 0

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.

Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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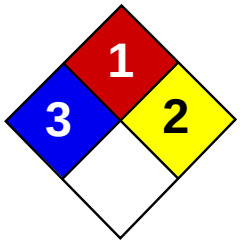
Last Updated: 11/06/2008 12:00 PM



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

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
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. 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 if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

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. 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: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

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:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

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:
Use a shovel to put the material into a convenient waste disposal container. 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. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. 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, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

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: Safety glasses. 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:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

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

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble 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: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

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: 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 as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 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: Arsenic 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: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

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

Health: 3

Flammability: 1

Reactivity: 2

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. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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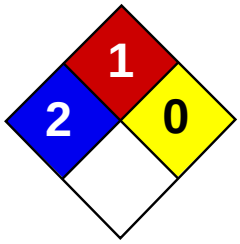
Last Updated: 11/06/2008 12:00 PM



Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

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
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

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).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. 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. 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: Not available.

Ingestion:
Do not induce vomiting. 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: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

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:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

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. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. 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. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

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:
TWA: 1 (mg/m3) from ACGIH [1990] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

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

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold 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: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

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

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

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 as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper Massachusetts RTK: Copper TSCA 8(b) inventory: Copper CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 1

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.

Created: 10/09/2005 04:58 PM

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

MATERIAL SAFETY DATA SHEET

Date Printed: 05/17/2006
Date Updated: 01/28/2006
Version 1.4

Section 1 - Product and Company Information

Product Name	10.00 G ZINC FIXANAL AS ZINC SULFATE
Product Number	38950
Brand	RIEDEL
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
ZINC STANDARD CONCENTRATE	None	No

Ingredient Name	CAS #	Percent	SARA 313
WATER	7732-18-5	84	No
ZINC SULFATE HEPTAHYDRATE	7446-20-0	16	Yes

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Dangerous for the environment. Harmful.
Harmful if swallowed. Irritating to eyes and skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Target organ(s): Liver. Kidneys.

HMIS RATING

HEALTH: 2*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult,

call a physician.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Respiratory protection is not required. Where protection is desired, use multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges.
Hand: Protective gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Zinc/zinc oxides, Sulfur oxides.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Kidneys. Pancreas. Liver. Lungs.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Environmentally hazardous substances, liquid, n.o.s.
UN#: 3082
Class: 9
Packing Group: Packing Group III
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s.
IATA UN Number: 3082
Hazard Class: 9
Packing Group: III

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: Xi-N
Indication of Danger: Irritant. Dangerous for the environment.
R: 41-50/53
Risk Statements: Risk of serious damage to eyes. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 26-39-61
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear eye/face protection. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Dangerous for the environment. Harmful.
Risk Statements: Harmful if swallowed. Irritating to eyes and skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: Avoid contact with eyes. Wear suitable protective clothing. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Target organ(s): Liver. Kidneys.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

APPENDIX C

Roux Health and Safety Lessons Learned / Accident Report Forms

HEALTH AND SAFETY LESSONS LEARNED
ROUX REPORT FORM

☐ **Roux Associates, Inc.** ☐ **Remedial Engineering, P.C.**
(Check applicable company name)

PART 1: ADMINISTRATIVE INFORMATION

Office: ☐ New York ☐ Massachusetts ☐ New Jersey ☐ Illinois ☐ CA - Los Angeles ☐ CA - Oakland

Project Manager:	**Project Principal:**
Project Name:	**Project Location:**

PART 2: LESSONS LEARNED INCIDENT DETAILS

Date\Time Occurred (MM/DD/YYYY HH:MM)**:**	**Date\Time Submitted** (MM/DD/YYYY HH:MM)**:**

LESSONS LEARNED INCIDENT TYPE - What could have happened? - Select all that apply (1-7)

1. ☐ Fire / Explosion
2. ☐ Injury / Illness
3. ☐ Security (e.g, theft, trespassing, vandalism)
4. ☐ Environmental (spill, permit exceedance, etc.)
5. ☐ Transportation of personnel (vehicle accident)
6. ☐ Property/Equipment Damage
7. ☐ Business Interruption

Event Leading to Potential Injury/Illness:

Job Task*:	**Equipment Involved*:**

WHAT HAPPENED? Do not include individuals' names. Ensure photos, sketches, etc. are not personally identifiable unless written consent has been obtained.

Summary (1-2 sentences. Provide brief description of the incident. Provide facts only, no speculation or opinion)**:**

Incident Details (Brief factual details of what, where, when; include photos, sketches, etc. as attachments)**:**

Immediate Corrective Actions Taken:

SERIOUS INJURY OR FATALITY (SIF): IF AN ACTUAL SIF, USE EXISTING ROUX ACCIDENT REPORTING FORM

Could this have resulted in a SIF? ☐ **Yes** ☐ **No**

A potential SIF is defined as likely to have caused an injury resulting in significant physical body damage with probable long term and/or life altering complications.

INCIDENT INVOLVED:

Roux Employee: ☐ **Yes** ☐ **No** **Subcontractor Company Name:**

INVESTIGATION TEAM

NAME	JOB TITLE	NAME	JOB TITLE

PART 3: INCIDENT INVESTIGATION FINDINGS AND REPORT QUALITY REVIEW

Date Investigation Team Assigned (mm/dd/yyyy):

INVESTIGATION SUMMARY: Determine from list below what behaviors and/or conditions may have contributed to the H&S Lessons Learned Incident. Then, use the "Multiple-Why Technique" for each of these behaviors/conditions; provide a narrative for each that explains how the associated Root Cause(s) was determined. Do not include individuals' names.

ROOT CAUSES: HOW TO REDUCE POSSIBILITY OF INCIDENT RECURRING
Selection of RCs and solutions reflects the analysis of investigation team. It is not meant as a legally binding conclusion as to causal factors and/or solutions.

PERSONAL FACTORS:

A. LACK OF SKILL OR KNOWLEDGE

B. DOING THE JOB ACCORDING TO PROCEDURES OR ACCEPTABLE PRACTICES TAKES MORE TIME OR EFFORT

C. SHORT-CUTTING PROCEDURES OR ACCEPTABLE PRACTICES IS POSITIVELY REINFORCED OR TOLERATED

D. IN PAST, DID NOT FOLLOW PROCEDURES OR ACCEPTABLE PRACTICES AND NO INCIDENT OCCURRED

JOB FACTORS:

E. LACK OF OR INADEQUATE PROCEDURES

F. INADEQUATE COMMUNICATION OF EXPECTATIONS REGARDING PROCEDURES OR ACCEPTABLE STANDARDS

G. INADEQUATE TOOLS OR EQUIPMENT (available, maintained, etc.)

Behavior / Condition	Root Cause	Solution(s) (Must Match Root Cause)	Person Responsible for	Completion Target Date	Completion Actual Date

			Completion		

QUALITY REVIEW Correct root cause(s) identified? Do root cause(s) and solution(s) match? Are solution(s) feasible / maintainable?

Name: **Job Title:**

PART 4: Date Solutions were Implemented & Validated (Were Solutions Effective?)

Date	Solution	Verifier / Validator Name and Job Title	**Details** (of I & V performed)

JOB TASK - Select the most appropriate one (primary job associated with incident-related work activity, avoid "Other" if possible)

1. Carbon Change
2. Construction
3. Demolition
4. Dewatering
5. Drilling (well install)
6. Excavation / Trenching
7. Gauging
8. Geoprobe / Direct Push
9. Mobil Remediation (includes vacuum event and chemical injection)
10. NAPL Recovery
11. O&M (remediation system)
12. Pavement Cutting
13. Pump Test
14. Sampling
15. Site Visit / Survey
16. Subsurface Clearance
17. System Install
18. System Startup
19. UST Removal (includes exposure and backfill)
20. Waste Management
21. Well Abandonment
22. Other:

EQUIPMENT INVOLVED THAT CONTRIBUTED TO H&S LESSONS LEARNED - Select all that apply

1. Air Stripper
2. API Separator
3. Automobile
4. Boom Material
5. Bulldozer
6. Cable
7. Carbon Drum / Vessel
8. Chain Block
9. Compressor, Air
10. Control Panel (local)
11. Crane (mobile)
12. Drill Rig
13. Drilling Equipment, Vacuum
14. Drum, Vertical
15. Dump Truck
16. Electric Heater
17. Electrical Power Supply
18. Engine, Combustion
19. Equipment Safety Grounding
20. Excavator / Power Shovel
21. Exclusion Zone Equipment
22 Fan / Blower
23 Fencing
24 Filter
25. Fire Extinguisher
26. Forklift
27. Front End Loader
28. Grader
29. Hammer
30. Knife
31. Non-Powered Equipment
32. Powered Equipment
33. Drill
34. Grinder
35. Hydraulic Torque Wrench
36. Powered Saw
37. Impact Wrench
38. Saw
39. Screwdriver
40. Shears
41. Shovel
42. Snip
43. Wrench
44. Hoist
45, Hook/Clamp/Buckle, etc.
46. Jack
47. Ladder, Extension
48. Ladder, Platform
49. Ladder, Step
50. Lock Out / Tag Out
51. Maintenance Tool, General
52. Manifold
53, Manlift/Basket/Cherry Picker
54. Motor, Electric
55. Oxidizer
56. Pallet
57. Piping
58. Piping, Hose
59. Piping, Injection/Mixing Point
60. Hydrojet
61. Centrifugal Pump
62. Diaphragm Pump
63. Reciprocating Pump
64. Regenerative Pump
65. Rotary Pump
66. Transfer Pump
67. Submersible Pump
68. Face Shield
69. Fall Protection
70. Gloves
71. Hard Hat / Helmet
72. Hearing Protection
73. Respiratory PPE (Chemical)
74. Respiratory PPE (Particulate)
75. Safety Glasses
76. Safety Goggles
77. Safety Shoes / Boots
78. Safety Vest / Clothing
79. Rope
80. Bailer
81. Geoprobe
82. Hand Auger
83. PID
84. Multi-Gas Meter
85. Sample Container
86. Split-Spoon Sampler
87. Sling
88. Snow Blower
89. Snow Plow
90. Space Heater
91. Air Sparging System
92. Carbon Treatment System
93. Chemical Oxidation System
94. Dual Phase Product Recovery System
95. Groundwater Pump and Treat System
96. POET System
97. Shed or Trailer
98. Vapor Extraction System
99. Vapor-Phase Treatment System
100. Other System, Type:_____
101. Surge Tank
102. Underground Tank
103. Telemetry System
104. Testing Devices
105. Tractor Trailer
106. Truck, Flatbed
107. Truck, Pickup
108. Truck, Tank Truck
109. Truck, Vacuum
110. Safety Valve
111. Block Valve
112. Extraction Well
113. Monitoring Well
114. Recovery Well
115. Winch
116. Wire Rope
117. No Equipment Involved
118. MPT – Traffic Control Devices
118. Not in List (describe):_____

☐ **Roux Associates, Inc.** ☐ **Remedial Engineering, P.C.**
(Check applicable company name)

ACCIDENT REPORT

Joe Gentile, Corporate Health and Safety Manager
Cell: (610) 844-6911; Office: (856) 423-8800; Office FAX: (856) 423-3220; Home: (484) 373-0953

PART 1: ADMINISTRATIVE INFORMATION

Project #: _____
Project Name: _____
Project Location (street address/city/state)**:**
_____
_____
Client Corporate Name / Contact / Address / Phone #:
_____
_____
_____
_____
_____

Immediate Verbal Notifications Given To:

Corporate Health & Safety	☐Yes	☐No
Office Health & Safety	☐Yes	☐No
Office Manager	☐Yes	☐No
Project Principal	☐Yes	☐No
Project Manager	☐Yes	☐No
Client Contact	☐Yes	☐No

REPORT STATUS (time due):
☐ Initial (24 hr) ☐ Final (5-10 days)
Date: _____ Date: _____

Accident Report Delivered To:

Corporate Health & Safety	☐Yes	☐No
Office Health & Safety	☐Yes	☐No
Office Manager	☐Yes	☐No
Project Principal	☐Yes	☐No
Project Manager	☐Yes	☐No

REPORT TYPE: ☐ Loss ☐ Near Loss Estimated Costs: $ _____

OSHA CASE # Assigned by Corporate Health & Safety if Applicable:

Corporate Health & Safety Confirmed Final Accident Report
☐Yes ☐No

DATE OF INCIDENT: _____

TIME INCIDENT OCCURRED: _____ ☐AM ☐PM

INCIDENT LOCATION – City, State, and Country (If outside U.S.A.) _____

INCIDENT TYPES: (Select most appropriate if Loss occurred.)
From lists below, please select the option that best categories the incident. When selecting an injury or illness, also indicate the severity level.

☐**INJURY** ☐**ILLNESS**

----------**Severity Level**----------

☐Fatality ☐First Aid ☐Medical
☐Restricted Work ☐Lost Time Treatment

OTHER INCIDENT TYPES

☐Spill / Release
Material involved: _____
Quantity (U.S. Gallons): _____

☐Misdirected Waste ☐Consent Order ☐NOV
☐Property Damage ☐Exceedance
☐Motor Vehicle ☐Fine / Penalty

ACTIVITY TYPE (Check most appropriate one.)

☐ Decommissioning	☐Geoprobe	☐Sampling
☐Demolition	☐Motor Vehicle	☐System Start-up
☐Dewatering	☐Operations/ Maintenance	☐Trenching
☐Drilling		☐AST/UST Removal
☐Excavation	☐Pump/Pilot Test	☐Other_____
☐Gauging	☐Rigging/Lifting	

INJURY TYPE (Check all applicable.)

☐Abrasion	☐Occupational Illness
☐Amputation	☐Puncture
☐Burn	☐Rash
☐Cold/Heat Stress	☐Repetitive Motion
☐Inflammation	☐Sprain/Strain
☐Laceration	☐Other_____

BODY PART AFFECTED (Check all applicable.)

☐Respiratory	☐Shoulder	☐Face
☐Neck	☐Arm	☐Leg
☐Chest	☐Wrist	☐Knee
☐Abdomen	☐Hand/Fingers	☐Ankle
☐Groin	☐Eye	☐Foot/Toes
☐Back	☐Head	☐Other_____

I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Directly/Indirectly Involved in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:
1)				
2)				

II. PERSONS INJURED IN INCIDENT (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Injured in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:	Description of Injury:
1)					
2)					

No One Gets Hurt!

III. PROPERTY DAMAGED IN INCIDENT (Attach additional information as necessary/applicable.)

Property Damaged:	Property Location:	Owner Name, Address & Phone #:	Description of Damage:	Estimated Cost:
1)				
2)				$

IV. WITNESSES TO INCIDENT (Attach additional information as necessary/applicable.)

Witness Name:	Address:	Phone #:
1)		
2)		

PART 2: WHAT HAPPENED AND INCIDENT DETAILS

PROVIDE FACTUAL DESCRIPTION OF INCIDENT (e.g., describe loss/near loss, injury, response / treatment).

I. AUTHORITIES/GOVERNMENTAL AGENCIES NOTIFIED (Attach additional information as necessary/applicable.)

Authority/Agency Notified:	Name/Phone #/Fax # of Person Notified:	Address of Person Notified:	Date & Time of Notification:	Exact Information Reported/Provided:

II. PUBLIC RESPONSES TO INCIDENT (if applicable)

Response/Inquiry By: (check one)	Entity Name:	Name/Phone # of Respondent/ Inquirer:	Address of Entity/Person:	Date & Time of Response/Inquiry:
☐Newspaper ☐Television ☐Community Group ☐Neighbors ☐Other _____				

Describe Response/Inquiry:

Roux/Remedial Response:

(Check all that apply.) (Attach photos, drawings, etc. to help illustrate the incident.)

ATTACHED INFORMATION: ☐Photo ☐Sketches ☐Vehicle Acord Form ☐Police Report ☐Other

Name(s) of person(s) who prepared Initial and Final Report:	**Title(s):**	**Phone number(s):**

PART 3: INVESTIGATION TEAM ANALYSIS

CONCLUSION: WHY IT HAPPENED (LIST CAUSAL FACTORS AND CORRESPONDING ROOT CAUSES)

(Root Causes: Lack of knowledge or skill, Doing the task according to procedures or acceptable practices takes more time or effort, Short-cuts or not following acceptable practices is reinforced or tolerated, Not following procedures or acceptable practices did not result in an accident, Lack of or inadequate procedures, Inadequate communications of expectations regarding procedures or acceptable practices, Inadequate tools or equipment, External Factors)

ROOT CAUSE(S) AND SOLUTION(S): HOW TO PREVENT INCIDENT FROM RECURRING

CAUSAL FACTOR	ROOT CAUSE		SOLUTION(S) [Must Match Root Cause(s)] #	SOLUTION(S) [Must Match Root Cause(s)] Solution(s)	PERSON RESPONSIBLE	AGREED DUE DATE	ACTUAL COMPLETION DATE

INVESTIGATION TEAM:

PRINT NAME	JOB POSITION	DATE	SIGNATURE

APPENDIX D

Health and Safety Briefing / Meeting Log and Daily Site Safety Checklist

HEALTH AND SAFETY BRIEFING / TAILGATE MEETING FORM

Site Name / Location _____

Date: _____ Weather Forecast: _____

Names of Personnel Attending Briefing

_____ _____ _____

_____ _____ _____

_____ _____ _____

Planned Work

_____

_____

_____

Instrument Calibration: Instrument/Time/Cal. Gas/Cal. Concentration/Actual Concentration

_____

_____

_____

Items Discussed

_____

_____

_____

_____

_____

Work Permit Type and Applicable Restrictions

_____

_____

_____

Signatures of Attending Personnel

_____ _____ _____

_____ _____ _____

_____ _____ _____

APPENDIX E

Roux Heavy Equipment Exclusion Zone Policy

FINAL

STANDARD OPERATING PROCEDURE 1.13

HEAVY EQUIPMENT EXCLUSION ZONE POLICY

CORPORATE HEALTH AND SAFETY MANAGER	:	Joseph W. Gentile
EFFECTIVE DATE	:	February 2014
REVISION NUMBER	:	1

Objective

The purpose of the Exclusion Zone Policy is to establish the minimum clearance distance that must be maintained between workers and heavy equipment while equipment is in operation (i.e., engaged or moving). The intent is to have no personnel or other equipment entering the Exclusion Zone while the equipment is in operation/moving to ensure that Roux and Subcontractor employees are not unnecessarily exposed to the hazards of the equipment.

A. Definition

For the purpose of this policy, heavy equipment includes, but is not necessarily limited to: excavation equipment, drill rigs, vacuum trucks, forklifts, lull telehandlers, man lifts, bobcats, delivery trucks, etc.

B. Requirements

1. Exclusion Zones must be established and maintained during activities involving the movement/operation of heavy equipment. The Exclusion Zone requirements apply to all personnel on the site but are primarily focused on those personnel who are required to be working in the vicinity of the equipment. The exclusion zone is in effect when heavy equipment is moving or engaged (ex. movement of an arm or bucket of an excavator, rotation of an auger, lifting of a load with a forklift, raising/lowering of a man lift, etc.).

2. The Exclusion Zone must meet the following minimum requirements:

   - A minimum distance of 10 feet from all heavy equipment and loads being moved by the equipment; and
   - Greater than the swing/reach radius of any moving part on the heavy equipment (i.e., for large equipment this may mean an exclusion zone distance larger than 20 feet);
   - Greater than the tip-over distance of the heavy equipment; and
   - Greater than the radius of blind spots.

3. The size of the Exclusion Zone will need to be determined on a task-specific basis considering the size of the heavy equipment in use and the task being performed. Prior to all heavy equipment operations, the Exclusion Zone(s) distance must be specifically identified in the Job Safety Analysis (JSA).

4. The spotter (or another individual) should be assigned responsibility for enforcing the Exclusion Zone. This spotter should be positioned immediately outside of the Exclusion Zone within a clear line of sight of the equipment operator. The spotter must signal the operator to stop work if anyone or anything has the potential to enter or compromise the Exclusion Zone. The operator should stop work if the spotter is not within his/her line of sight. If multiple pieces of equipment are being used, each piece of equipment must have its own Exclusion Zone and spotter. For large excavation and demolition projects the spotter should be in constant radio contact (not cell phone) with the machine driver.

5. If an individual must enter the Exclusion Zone, the designated Spotter must signal the Equipment Operator to stop the equipment. Once the equipment is no longer moving (ex. movement of an arm of an excavator is STOPPED, lifting of a load with a forklift STOPPED, raising/lowering of a man lift is STOPPED, etc.), the operator must **DISENGAGE THE CONTROLS and STOP and SIGNAL BY "SHOWING HIS HANDS"**. This signal

will indicate that it is safe for the personnel to enter the limits of the Exclusion Zone to perform the required activity. The equipment must remain completely stopped/disengaged until all personnel have exited the limits of the Exclusion Zone and the designated Spotter has signaled by "SHOWING HIS HANDS" to the Equipment Operator that it is safe to resume.

6. When entering the limits of the Exclusion Zone, personnel must at a minimum:
   - Establish eye contact with the operator and approach the heavy equipment in a manner that is in direct line of sight to the Equipment Operator;
   - Never walk under any suspended loads or raised booms/arms of the heavy equipment; and
   - Identify a travel path that is free of Slip/Trip/Fall hazards.
7. The Exclusion Zone should be delineated using cones with orange snow fence or solid poles between the cones, barrels, tape or other measures. For work in rights-of-way rigid barriers, such as Jersey barriers or temporary chain link fence should be used. For certain types of wide-spread or moving/mobile equipment operations, such delineation may not be practicable around pieces of equipment or individual work areas. In such instances it is expected that the entire operation will be within a larger secure work area or that additional means will be utilized to ensure security of the work zone.

C. Exceptions

It is recognized that certain heavy equipment activities may require personnel to work within the limits of the Exclusion Zone as specified in this policy. Such activities may include certain excavation clearance tasks, drill crew activities or construction tasks. However, any such activity must be pre-planned with emphasis on limiting the amount and potential exposure of any activity required within the zone. The critical safety steps to mitigate the hazards associated with working within the Exclusion Zone must be defined in the JSA and potentially other project-specific plans (i.e., critical lift plans, etc.), and approved by the Roux Project Principal and client representative, if required, prior to implementation.

D. Responsibilities

1. Corporate Health and Safety Manager

   Overall responsibility for administration, implementation and auditing of this policy.

2. Office Managers

   Responsible for communicating this policy to all of their employees who perform or may perform field work involving heavy equipment.

3. Office Health and Safety Managers

   Providing training to office field staff in this policy.

4. Project Principals

   a. Responsible for ensuring their projects address heavy equipment exclusion zones.

   b. Approving exceptions to this policy.

5. Project Managers

    a. Responsible for incorporating this policy into their project HASPs and applicable procedures to include JSAs.

    b. Communicating to and enforcing the policy requirements for subcontractors who work on their projects.

6. Field Workers

    a. Attending training in the policy.

    b. Following the requirements of the policy.

E. Project and Site-Specific Orientation and Training

Many Roux projects have different requirements that are client-specific or site-specific in nature. It is the responsibility of the Project Principal (or Project Manager if delegated this responsibility by the Project Principal) to ensure that the workers assigned to his/her projects are provided orientation and training with respect to these client and/or site-specific requirements.

F. Subcontractors

All subcontractors who provide heavy equipment operations to field projects must implement a policy that meets or exceeds the expectations described above as well as any additional requirements that may be required on a client or site-specific basis.

APPENDIX F

Roux Subsurface Utility Clearance Procedure

STANDARD OPERATING PROCEDURE 1.17

SUBSURFACE UTILITY CLEARANCE

CORPORATE HEALTH AND SAFETY MANAGER	:	Joseph W. Gentile
EFFECTIVE DATE	:	2/04/15
REVISION NUMBER	:	0

TABLE OF CONTENTS

1.0 PURPOSE

Roux Associates, Inc. (Roux Associates) has instituted the following Standard Operating Procedure (SOP) for completing proper utility mark-outs and for conducting subsurface clearance activities. The SOP establishes a method to ensure, to the greatest extent possible, that utilities have been identified and contact and/or damage to underground utilities and other subsurface structures will be avoided.

2.0 SCOPE AND APPLICABILITY

This SOP applies to all Roux Associates employees, its contractors and subcontractors. Employees are expected to follow the SOP for all intrusive work involving Roux Associates or other personnel (e.g., contractors/subcontractors) working for Roux Associates unless the client's requirements are more stringent. Deviation from the SOP regardless of the specific work activity or work location must be pre-approved per Section 4.3 of this SOP.

3.0 DEFINITIONS

Intrusive Work Activities	All activities such as digging or scraping the surface, including but not limited to, excavation, test pitting or trenching, soil vapor sampling or the installation of soil borings, soil vapor monitoring points and wells, or monitoring wells, and drilling within the basement slab of a recently demolished building.
Mark-out / Stake Out	The process of contracting with a competent and qualified company to confirm the presence or absence of underground utilities and structures. This process will clearly mark-out and delineate utilities that are identified so that intrusive work activities can be performed without causing disturbance or damage to the subsurface utilities and structures. After utility mark-outs are completed the soft digging will be completed prior to intrusive work.
Tolerance Zone	Defined as two feet on either side of the designated centerline of an identified utility, plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct backs and other non-cylindrical utilities) of that utility and two feet from the outside edge of any subsurface structure.
Structure	For the purpose of this SOP a structure is defined as any underground feature that may present potential source(s) of energy such as, but not limited to, utility vaults, bunkers, piping, electrical boxes, wires, conduits, culverts, utility lines, underground tanks and ducts.
Soft Digging	The safest way to remove material from unknown obstructions or services is by using tools such as a vactor or air knife, non-mechanical tools, or hand tools. The methods are clean and non-evasive and used for uncovering and exposing buried services and excavating and for providing a quick method of soil removal from sensitive areas.
Verification	Exploratory test-hole dug with hand tools within the Tolerance Zone to expose and verify the location, type, size, direction-of-run and depth of a utility or subsurface structure. Vacuum excavation (soft dig) methods can further facilitate exposure of a subsurface utility and accurately provide its location ad identification prior to intrusive work approaching the Tolerance Zone.

4.0 RESPONSIBILITIES

It shall be the responsibility of all Roux Associates employees who oversee or perform intrusive field activities to ensure adequate mark-outs of underground utilities and structures have been provided, reviewed and discussed with the field team. This includes documenting that the mark-out was correctly performed by completing the Mark-out / Stake-out Request Information Sheet (Appendix A) and using the Roux Subsurface Clearance Checklist (Appendix B). Additionally the following personnel have specific responsibilities for implementing this SOP.

4.1 Corporate Health and Safety Manager (CHSM)

- The CHSM has the responsibility of ensuring that a program has been established and is in place to provide guidance for performing adequate utility mark-outs and subsurface utility clearance activities.

- The CHSM has the overall responsibility of implementing this SOP and communicating the contents of this SOP to Office Managers (OMs) and Office Health and Safety Managers (OHSMs).

- The CHSM will periodically, quarterly at a minimum, communicate learnings from mark-outs and subsurface utility clearance incidents and follow-up actions taken to all personnel via Clarity®.

- The CHSM will periodically review and evaluate the effectiveness of this SOP on a quarterly basis.

4.2 Office Manager (OM)

- Each OM will designate an individual to serve as the respective office's OHSM. The OHSM will be vested with the responsibility of assisting in implementation of this SOP's requirements.

- Each OM will ensure that their respective office's staff are made aware of and abide by the requirements of this SOP.

4.3 Project Principals (PPs)

- PPs are responsible for ensuring this SOP is followed for intrusive work performed at their sites. This SOP recognizes that Roux may only be in the position of suggesting, discussing and requesting that this SOP be implemented to our clients.

- PPs have the authority to consider exceptions to this SOP based on their client's site knowledge, site experience and the client's willingness for the use of this SOP. Any and all exceptions, however, will be documented and pre-approved by the OM.

4.4 Project Manager (PM)

- It shall be the PM's responsibility to ensure this SOP is properly implemented. The PM has the responsibility for sharing all Lessons Learned from subsurface utility clearance incidents with the project team.

- The PM has the responsibility of reviewing and editing draft reports of subsurface utility clearance incidents and for filing the finalized reports in the appropriate project files.

4.5 Office Health and Safety Manager (OHSM)

- Each OHSM will ensure that their respective office's staff is trained in this SOP.

- It is the responsibility of the OHSM to review Lessons Learned and Accident Reporting Forms (existing Roux forms) for utility mark-outs and subsurface utility clearance incidents and to assist project teams in finalizing reports.

- The OHSM will review final draft incident reports of subsurface utility clearance incidents, ensure they are finalized and provide the finalized report to the CHSM, OM and the PM for inclusion in the project files as appropriate.

- The OHSM will track all subsurface utility clearance incidents until completed.

- The OHSM will provide the CHSM with all finalized reports of subsurface utility clearance incidents containing follow-up actions for sharing throughout the firm

4.6 All Personnel

- All personnel are responsible for ensuring Public Utility Mark-outs were requested by the subcontractor, performed for all known or suspected utility types and document the process by completion of Roux Subsurface Utility Clearance Checklist and Utility Verification / Site Walkthrough Record.

5.0 PROCEDURES

5.1 Before Intrusive Activities

During the project kick-off meeting for intrusive activities the PM will review the Roux Subsurface Utility Clearance Checklist and Utility Verification / Site Walkthrough Record (Appendix B) and the below bullet points with the project field team:

(Please note that these are intended as general reminders only and should not be solely relied upon.)

- Ensure the Mark-out / Stake-out Request Information Sheet (or one-call report is complete and accurate for the site including address and cross streets) is completed and review for missing utilities (note utility mark-out organizations do not have contracts with all utilities and it is often necessary to contact certain utilities separately such as the local water and sewer authorities).

- Have written confirmation prior to mobilizing to the site that the firm or Roux personnel performing the intrusive activity has correctly completed the mark-out notification process including requesting mark-outs, waiting for mark-outs to be applied to ground surfaces at the site, and receiving written confirmation of findings (via fax or email) from utility operators for all known or suspected utilities in the proposed area of intrusive activity, and provided utility owner written confirmation to Roux Associates personnel for review and project files documentation.

- Do not begin any intrusive activity until any utilities mark-out has been completed (i.e., did all utilities mark-out the site?) and any unresolved mark-out issues are finalized. Perform a site walk to review the existing utilities and determine if said utilities have been located by the utility locators.
  - (Note: The Tolerance Zone is defined as two feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks and other non-cylindrical utilities) of a utility and two feet from the outside edge of any subsurface structure.)

- Install Pre-Clearance exploratory test holes (e.g., hand-dug test holes or other soft digging techniques) for the first 5-ft below land surface (BLS) at each location prior to conducting mechanized intrusive activities. The size of the pre-clearance exploratory test hole should be at a minimum twice the diameter of any downhole tool or boring device. (Note: Pre-Clearance exploratory test holes should be defined in the SOW/proposal as being provided to the client to prevent project delays and to allow adequate time for PM and PP to evaluate alternative approaches for the project. Alternative approaches will need to be pre-approved by the OM.

- For excavations, all utilities need to be marked and then exposed by hand following the protocols in this SOP. Pre-clearing for excavations may be performed by the "moat" technique (i.e., soft digging around the perimeter). In these cases, dig in small lifts (<12" for first 5 feet) using a dedicated spotter.) For Tolerance Zone work, unless

otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes performed to expose the utility. Once structures have been verified a minimum clearance of two feet must be maintained between the utility and any powered equipment.

- In addition, the following activities should be conducted:
  - Review the work scope to be performed with the site owner/tenant to determine if it may impact any utilities,
  - Attempt to procure any utility maps or historic drawings of subsurface conditions of the site,
  - **Determine the need for utility owner companies to be contacted or to have their representatives on site, and**
  - Where mark-outs terminate at the property boundary, consider the use of private utility locating / GPR / Geophysical-type services which may be helpful in locating utilities. Use of private utility locating firms, however, does not eliminate the legal requirement for the Excavator firm to submit a request for Public Utility Mark-outs. Also, the information provided by the service may be inaccurate and unable to locate subsurface utilities and structures in urban areas, landfills, urban fill areas and below reinforced slabs, etc. They should not be relied upon as the only means of performing utility clearance.

5.2 During Intrusive Activities

The PM, field team lead or personnel performing oversight is to:

- Ensure the mark-out remains valid. (In certain states there are limits regarding the duration of time after the mark-out was applied to the ground surface work can be started or interrupted.) Additionally, the mark-outs must be maintained, documented, and in many cases refreshed periodically to be considered valid.
- Ensure intrusive activities are only performed within the safe boundaries of the mark-out as detailed in the One-Call Report.
- Halt all work if intrusive activities must take place outside of the safe boundaries of a mark-out and only proceed after new mark-outs are performed.
- Halt the intrusive activities and immediately consult with the PP if an unmarked utility is encountered.
- Completing any subsurface utility clearance incident reports that are necessary.

6.0 APPENDICES

- Example Completed One-Call Report (Appendix A)
- Roux Subsurface Clearance Checklist and Utility Verification / Site Walkthrough Record (Appendix B)

APPENDIX A

Example Completed One-Call Report

New York 811

Send To: C_EMAIL Seq No: 744

Ticket No: 133451007 ROUTINE

Start Date: 12/16/13 Time: 7:00 AM Lead Time: 20

State: NY County: QUEENS Place: QUEENS
Dig Street: 46TH AVE Address:
Nearest Intersecting Street: VERNON BLVD
Second Intersecting Street: 11TH ST

Type of Work : SOIL BORINGS
Type of Equipment : GEOPROBE
Work Being Done For: ROUX

In Street: X On Sidewalk: X Private Property: Other:
On Property Location if Private: Front: Rear: Side:

Location of Work: MARK THE ENTIRE NORTH SIDE OF THE STREET AND SIDEWALK OF:
46TH AVE BETWEEN VERNON BLVD AND 11TH STREET

Remarks:

Nad: Lat: Lon: Zone:
ExCoord NW Lat: 40.7475399 Lon: -73.9534811 SE Lat: 40.7457406 Lon: -73.9493680

Company : ZEBRA ENVIROMENTAL Best Time: 6AM-5PM
Contact Name : DAVID VINES Phone: (516)596-6300
Field Contact : DAVID VINES Phone: (516)596-6300
Caller Address: 30 N PROSPECT AVE Fax Phone: (516)596-4422
LYNBROOK, NY 11563
Email Address : david@zebraenv.com

Additional Operators Notified:
ATTNY01 AT&T CORPORATION (903)753-3145
CEQ CONSOLIDATED EDISON CO. OF N.Y (800)778-9140
MCINY01 MCI (800)289-3427
PANYNJ01 PORT AUTHORITY OF NY & NJ (201)595-4841
VZQ VERIZON COMMUNICATIONS (516)297-1602

Link to Map for C_EMAIL: http://ny.itic.occinc.com/XGMZ-DF2-L23-YAY

Original Call Date: 12/11/13 Time: 1:15 PM Op: webusr
IMPORTANT NOTE: YOU MUST CONTACT ANY OTHER UTILITIES DIRECTLY.

APPENDIX B

Roux Subsurface Utility Clearance Checklist

Date of Revision – 12/3/14

Work site set-up and work execution

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
Daily site safety meeting conducted, SPSAs performed, JSAs reviewed, appropriate work permits obtained				
HASP is available and reviewed by site workers / visitors				
Subsurface Utility Clearance Procedure has been reviewed with all site workers				
Work area secured; traffic control established as needed. Emergency shut-off switch located. Fire extinguishers / other safety equipment available as needed				
Utility mark-outs (public / private) clear and visible. Provide Excavator's Stake-Out Reference Number / Request Date / Time				
Tolerance zone work identified				
Work execution plan reviewed and adhered to (ground disturbance methods, clearance depths, any special utility protection requirements, or any other execution requirements; especially for Tolerance Zone work)				
Verbal endorsement received from Roux PM for any required field deviations to work execution plan				

Key reminders for execution:

The Subsurface Utility Clearance Protocol should be referenced to determine all requirements while executing subsurface work. The bullet points below are intended as general reminders only and should not be solely relied upon.

- Tolerance zone is defined as two feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks and other non-cylindrical utilities) of a utility and two feet from the outside of any subsurface structure.
- Install Pre-Clearance exploratory test holes (e.g., hand-dug test holes or vacuum excavation) must be performed for the first five feet below land surface (BLS) at each location prior to conducting mechanized intrusive activities. The size of the pre-clearance exploratory test hole

should be at a minimum twice the diameter of any downhole tool or boring device. (Note: Pre-clearance exploratory test holes should be defined in the SOW/proposal as being provided to the client to prevent project delays and to allow adequate time for PM and PP to evaluate alternative approaches for the project. Alternate approaches will need to be pre-approved by the OM.

- For excavations, all utilities need to be marked and then exposed by hand following the protocols in this SOP. Pre-clearing for excavations may be performed by the "moat" technique (i.e., soft digging around the perimeter). In these cases, dig in small lifts (<12" for first five feet) using a dedicated spotter.) For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes to expose the utility. Once structures have been verified a minimum clearance of two feet must be maintained between the utility and any powered equipment.

Utility Verification / Site Walkthrough Record

Employee Name: _____

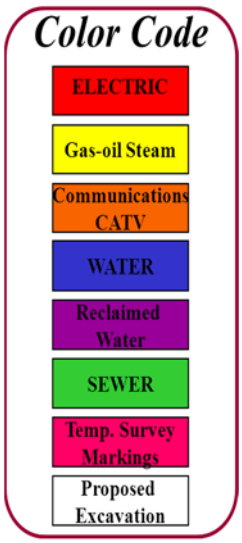
Date: _____

Instructions: For each utility suspected at the job site, indicate location on the job site, approximate burial depth, and means of detecting the utility. Leave blank if that utility is not believed to be present.

Utility	Description of Utility Location Identified On-site	Approx. Depth (bls)	Method / Instrumentation used to determine Utility Location	Utility Owner Response (Date/Time)	Mark Out Indicates (Clear / Conflict)
Electrical Lines					
Gas Lines					
Pipelines					
Steam Lines					
Water Lines					
Sanitary & Storm-water Sewer lines					
Pressured Air-Lines					
Tank Vent Lines					
Fiber Optic Lines					
Underground Storage Tanks					
Phone Lines/ Other					

bls - Below land surface

Site Sketch Showing Utilities:



Other Comments / Findings:

Completed by: _____

Signature: _____ Date: _____

APPENDIX G

ACORD® Automobile Loss Notice Form

AUTOMOBILE LOSS NOTICE

DATE (MM/DD/YYYY)

AGENCY	INSURED LOCATION CODE	DATE OF LOSS AND TIME	AM / PM
AJ Gallagher Risk Management Services 377 Oak Street Garden City, NY 11530			
CONTACT NAME: Teresa Garzia	CARRIER: Great Divide Insurance Company		NAIC CODE: 25224
PHONE (A/C, No, Ext): 516.622.2418	POLICY NUMBER: BAP154979912		
FAX (A/C, No):	POLICY TYPE: Commercial Automobile		
E-MAIL ADDRESS:			
CODE:	SUBCODE:		
AGENCY CUSTOMER ID: ROUXASS-01			

INSURED

NAME OF INSURED (First, Middle, Last)			INSURED'S MAILING ADDRESS
Roux Assiciates, Inc.			209 Shafter Street Islandia, NY 11749
DATE OF BIRTH	FEIN (if applicable): 11-2579482	MARITAL STATUS / CIVIL UNION (if applicable)	
PRIMARY PHONE #: ☐ HOME ☒ BUS ☐ CELL 631.232.2600	SECONDARY PHONE #: ☐ HOME ☐ BUS ☐ CELL		PRIMARY E-MAIL ADDRESS: legaldept@rouxinc.com SECONDARY E-MAIL ADDRESS: Fax Notice of Loss to: 631.232.1525

CONTACT ☐ CONTACT INSURED

NAME OF CONTACT (First, Middle, Last)		CONTACT'S MAILING ADDRESS
Cindy Albanese		Cindy Albanese 209 Shafter Street Islandia, NY 11749
PRIMARY PHONE #: ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE #: ☐ HOME ☐ BUS ☐ CELL	
WHEN TO CONTACT		PRIMARY E-MAIL ADDRESS: legaldept@rouxinc.com SECONDARY E-MAIL ADDRESS: Fax Notice of Loss to 631.232.1525

LOSS

LOCATION OF LOSS	POLICE OR FIRE DEPARTMENT CONTACTED
STREET:	
CITY, STATE, ZIP:	REPORT NUMBER
COUNTRY:	

DESCRIBE LOCATION OF LOSS IF NOT AT SPECIFIC STREET ADDRESS:

DESCRIPTION OF ACCIDENT (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

INSURED VEHICLE

VEH #	YEAR	MAKE	BODY TYPE	PLATE NUMBER	STATE
		MODEL:	V.I.N.:		

OWNER'S NAME AND ADDRESS ☐ (Check if same as insured)	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:	
	SECONDARY E-MAIL ADDRESS:	
DRIVER'S NAME AND ADDRESS ☐ (Check if same as owner)	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:	
	SECONDARY E-MAIL ADDRESS:	

RELATION TO INSURED (Employee, family, etc.)	DATE OF BIRTH	DRIVER'S LICENSE NUMBER	STATE	PURPOSE OF USE	USED WITH PERMISSION? (Y/N)

DESCRIBE DAMAGE

1. WAS A STANDARD CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) INSTALLED IN THE VEHICLE AT THE TIME OF THE ACCIDENT?	Y/N
2. WAS THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) IN USE BY A CHILD DURING THE TIME OF THE ACCIDENT?	Y/N
3. DID THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) SUSTAIN A LOSS AT THE TIME OF THE ACCIDENT?	Y/N

ESTIMATE AMOUNT:	WHERE CAN VEHICLE BE SEEN?:	WHEN CAN VEHICLE BE SEEN?:
OTHER INSURANCE ON VEHICLE - CARRIER:		POLICY NUMBER:

OTHER VEHICLE / PROPERTY DAMAGED

NON - VEHICLE? ☐ AGENCY CUSTOMER ID: _____

VEH #	YEAR	MAKE:	BODY TYPE:	PLATE NUMBER	STATE
		MODEL:	V.I.N.:		

DESCRIBE PROPERTY (Other Than Vehicle) | OTHER VEH/PROP INS? (Y/N) ☐

CARRIER OR AGENCY NAME | NAIC CODE | POLICY NUMBER

OWNER'S NAME AND ADDRESS

PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL | SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL

PRIMARY E-MAIL ADDRESS:

SECONDARY E-MAIL ADDRESS:

DRIVER'S NAME AND ADDRESS ☐ (Check if same as owner)

PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL | SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL

PRIMARY E-MAIL ADDRESS:

SECONDARY E-MAIL ADDRESS:

DESCRIBE DAMAGE

ESTIMATE AMOUNT | WHERE CAN DAMAGE BE SEEN?

INJURED

NAME & ADDRESS	PHONE (A/C, No)	PED	INS VEH	OTH VEH	AGE	EXTENT OF INJURY
		☐	☐	☐		
		☐	☐	☐		
		☐	☐	☐		
		☐	☐	☐		

WITNESSES OR PASSENGERS

NAME & ADDRESS	PHONE (A/C, No)	INS VEH	OTH VEH	OTHER (Specify)
		☐	☐	
		☐	☐	
		☐	☐	

REPORTED BY | REPORTED TO

REMARKS (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

APPLICABLE IN ALABAMA

Any person who knowingly presents a false or fraudulent claim for payment of a loss or benefit or who knowingly presents false information in an application for insurance is guilty of a crime and may be subject to restitution fines or confinement in prison, or any combination thereof.

APPLICABLE IN ALASKA

A person who knowingly and with intent to injure, defraud, or deceive an insurance company files a claim containing false, incomplete, or misleading information may be prosecuted under state law.

APPLICABLE IN ARIZONA

For your protection, Arizona law requires the following statement to appear on this form. Any person who knowingly presents a false or fraudulent claim for payment of a loss is subject to criminal and civil penalties.

APPLICABLE IN ARKANSAS, DELAWARE, KENTUCKY, LOUISIANA, MAINE, MICHIGAN, NEW JERSEY, NEW MEXICO, NORTH DAKOTA, PENNSYLVANIA, RHODE ISLAND, SOUTH DAKOTA, TENNESSEE, TEXAS, VIRGINIA, AND WEST VIRGINIA

Any person who knowingly and with intent to defraud any insurance company or another person, files a statement of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact, material thereto, commits a fraudulent insurance act, which is a crime, subject to criminal prosecution and civil penalties. In LA, ME, TN, and VA, insurance benefits may also be denied.

APPLICABLE IN CALIFORNIA

For your protection, California law requires the following to appear on this form: Any person who knowingly presents a false or fraudulent claim for payment of a loss is guilty of a crime and may be subject to fines and confinement in state prison.

APPLICABLE IN COLORADO

It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policy holder or claimant for the purpose of defrauding or attempting to defraud the policy holder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

APPLICABLE IN THE DISTRICT OF COLUMBIA

Warning: It is a crime to provide false or misleading information to an insurer for the purpose of defrauding the insurer or any other person. Penalties include imprisonment and/or fines. In addition, an insurer may deny insurance benefits, if false information materially related to a claim was provided by the applicant.

APPLICABLE IN FLORIDA

Pursuant to S. 817.234, Florida Statutes, any person who, with the intent to injure, defraud, or deceive any insurer or insured, prepares, presents, or causes to be presented a proof of loss or estimate of cost or repair of damaged property in support of a claim under an insurance policy knowing that the proof of loss or estimate of claim or repairs contains any false, incomplete, or misleading information concerning any fact or thing material to the claim commits a felony of the third degree, punishable as provided in S. 775.082, S. 775.083, or S. 775.084, Florida Statutes.

APPLICABLE IN HAWAII

For your protection, Hawaii law requires you to be informed that presenting a fraudulent claim for payment of a loss or benefit is a crime punishable by fines or imprisonment, or both.

APPLICABLE IN IDAHO

Any person who knowingly and with the intent to injure, defraud, or deceive any insurance company files a statement of claim containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN INDIANA

A person who knowingly and with intent to defraud an insurer files a statement of claim containing any false, incomplete, or misleading information commits a felony.

APPLICABLE IN KANSAS

Any person who, knowingly and with intent to defraud, presents, causes to be presented or prepares with knowledge or belief that it will be presented to or by an insurer, purported insurer, broker or any agent thereof, any written statement as part of, or in support of, an application for the issuance of, or the rating of an insurance policy for personal or commercial insurance, or a claim for payment or other benefit pursuant to an insurance policy for commercial or personal insurance which such person knows to contain materially false information concerning any fact material thereto; or conceals, for the purpose of misleading, information concerning any fact material thereto commits a fraudulent insurance act.

APPLICABLE IN MARYLAND

Any person who knowingly or willfully presents a false or fraudulent claim for payment of a loss or benefit or who knowingly or willfully presents false information in an application for insurance is guilty of a crime and may be subject to fines and confinement in prison.

APPLICABLE IN MINNESOTA

A person who files a claim with intent to defraud or helps commit a fraud against an insurer is guilty of a crime.

APPLICABLE IN NEVADA

Pursuant to NRS 686A.291, any person who knowingly and willfully files a statement of claim that contains any false, incomplete or misleading information concerning a material fact is guilty of a felony.

APPLICABLE IN NEW HAMPSHIRE

Any person who, with purpose to injure, defraud or deceive any insurance company, files a statement of claim containing any false, incomplete or misleading information is subject to prosecution and punishment for insurance fraud, as provided in RSA 638:20.

APPLICABLE IN NEW YORK

Any person who knowingly and with intent to defraud any insurance company or other person files an application for commercial insurance or a statement of claim for any commercial or personal insurance benefits containing any materially false information, or conceals for the purpose of misleading, information concerning any fact material thereto, and any person who in connection with such application or claim knowingly makes or knowingly assists, abets, solicits or conspires with another to make a false report of the theft, destruction, damage or conversion of any motor vehicle to a law enforcement agency, the Department of Motor Vehicles or an insurance company, commits a fraudulent insurance act, which is a crime, and shall also be subject to a civil penalty not to exceed five thousand dollars and the value of the subject motor vehicle or stated claim for each violation.

APPLICABLE IN OHIO

Any person who, with intent to defraud or knowing that he/she is facilitating a fraud against an insurer, submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

APPLICABLE IN OKLAHOMA

WARNING: Any person who knowingly and with intent to injure, defraud or deceive any insurer, makes any claim for the proceeds of an insurance policy containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN WASHINGTON

It is a crime to knowingly provide false, incomplete, or misleading information to an insurance company for the purpose of defrauding the company. Penalties include imprisonment, fines and denial of insurance benefits.

APPENDIX H

Job Safety and Health Protection Poster

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA
www.osha.gov

U.S. Department of Labor • **Occupational Safety and Health Administration** • **OSHA 3165**

APPENDIX I

Generic Community Air Monitoring Plan (CAMP)

APPENDIX I

New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

APPENDIX D

Community Air Monitoring Plan

December 13, 2017

D R A F T

COMMUNITY AIR MONITORING PLAN

1221 Spofford Avenue
Tax Lot 35 of Tax Block 2738
Bronx, New York

Prepared for

THE PENINSULA JV, LLC
111 8th Avenue
New York, New York 10011

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX *209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600*

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APPENDIX

1.0 INTRODUCTION

Remedial Engineering, P.C and Roux Associates, Inc. (collectively referred to herein as Roux Associates), on behalf of Peninsula JV, LLC, (the "Volunteer"), have developed a project specific Community Air Monitoring Plan (CAMP) to implement real time monitoring at 1221 Spofford Avenue (Site) during remedial construction activities.

The monitoring program will be implemented at all times during which earth disturbance activities are occurring. The CAMP is designed to provide a measure of protection for the downwind community and onsite workers not directly involved with the subject work activities from potential airborne contaminant releases as a direct result of remedial and construction activities. This plan is consistent with the New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan guidance document.

The specifics of the CAMP are presented in the following four (4) sections:

- 1.1 VOC Monitoring Approach
- 1.2 Particulate Monitoring Approach
- 1.3 Meteorological Monitoring Approach
- 1.4 Available Suppression Techniques

1.1 VOC Monitoring Approach

Total VOC concentrations in air will be monitored continuously at a location downwind of the excavation activities during all ground intrusive activities. An upwind monitoring station will be set up adjacent to where the excavation is occurring. The VOC monitoring equipment will be located at temporary monitoring stations that will be established daily based on Site logistics and weather conditions. The monitoring work will be conducted using MiniRAE 3000 (or equivalent) portable VOC monitors, or similar type monitors, for all VOC monitoring. The equipment will be calibrated at least once daily using isobutylene as the calibration gas. One (1) upwind and one (1) downwind monitor will be deployed each day. Each monitoring unit is equipped with an audible alarm to indicate exceedance of the action levels (as defined below and summarized in Table 1).

The equipment is capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total VOCs at the downwind perimeter of the Site exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If the ambient air concentration of total VOCs at the downwind perimeter of the Site persists at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of VOCs identified, suppression techniques employed to abate emissions, and monitoring continued. After these steps, work activities can resume if the total organic vapor level at the Site perimeter is below 5 ppm over the background concentration for the 15-minute average. If levels are in excess of 25 ppm above background, identified contributing ground-intrusive activities will be halted and vapor suppression techniques will be evaluated and modified until monitoring indicates VOC levels at the Site perimeter are below 5 ppm over background. Once VOC levels are below 5 ppm at the Site perimeter, work will resume with continued monitoring.

All 15-minute readings will be recorded and be available for State Regulator (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will be recorded. If an exceedance of the action level occurs, an Action Limit Report (ALR) will be completed, identifying the monitoring device location, the measured VOC level, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Appendix A. Additionally, the NYSDEC and NYSDOH will be notified within 24 hours of the VOC ALR generation. Daily monitoring equipment locations and meteorological conditions will also be documented on the daily CAMP Monitoring Location Plan. All documentation will be kept on file at the Site.

1.2 Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at temporary particulate monitoring stations set up at the sidewalk at upwind and downwind locations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action levels (as defined below and summarized in Table 1). Monitoring equipment will be MIE Data Ram monitors or equivalent. A minimum of

one (1) upwind and one (1) downwind monitor will be deployed each day, equipped with an omni-directional sampling inlet and a PM-10 sample head. The data logging averaging period will be set to 15-minutes with time and date stamp recording. Alarm averaging will be set at 90 micrograms per cubic meter ($\mu g/m^3$) per 15-minute period. This setting will allow proactive evaluation of Site conditions prior to reaching Action Levels of 100 $\mu g/m^3$ above background. The equipment will be outfitted with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. The monitoring will be used to compare values to the following:

- If the downwind PM-10 particulate level is 100 $\mu g/m^3$ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the Site, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the Site.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped, a re-evaluation of activities initiated, and dust suppression techniques modified. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All 15-minute readings will be recorded and be available for State Regulator (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will be recorded. If an exceedance of the action level occurs, an ALR will be completed, identifying the monitoring device location, the measured particulate concentration, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Appendix A. Daily monitoring equipment locations will also be documented on the daily CAMP Monitoring Location Plan. All documentation will be kept on file at the Site.

1.3 Meteorological Monitoring

Wind speed (estimated) and wind direction, will be approximated based on field observations of onsite personnel. Meteorological data consisting of temperature, barometric pressure, and relative humidity will be recorded in the field book based upon publically available information from local weather stations.

1.4 Available Suppression Techniques

Odor Control

Due to the nature of the project, with excavation occurring, the potential for generation of nuisance odors and the need for odor control may be necessary. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) use of chemical odorants in spray or misting systems; and, (e) use of staff to monitor odors in surrounding neighborhoods.

Dust Control

Due to the nature of the project, the potential for generation of nuisance dust and the need for dust control may be necessary. Dust suppression will be achieved through the use of water for wetting excavation areas, if required. Water will be available on-site at suitable supply and pressure for use in dust control.

1.5 Reporting

All recorded monitoring data will be downloaded and field logged periodically, including action limit reports (if any) and daily CAMP monitoring location plans. All records will be maintained onsite and available for NYSDEC/NYSDOH review. A summary of CAMP findings, including excursions, will be provided in the Daily and Monthly Reports. All CAMP monitoring records will be included in the overall Final Engineering Report that will be submitted to the NYSDEC and NYSDOH and will include all of the CAMP data collected, daily monitoring station location maps, and copies of the ALRs (if any). If an ALR is generated due to VOC exceedances, the NYSDEC and NYSDOH will be notified within 24 hours of the exceedance.

TABLE

1. Action Limit Summary for VOCs and Particulates

Table 1. Action Limit Summary for VOCs and Particulates, Peninsula Redevelopment Project, 1221 Spofford Avenue, Bronx, NY

Contaminant	Downwind Action Levels*	Action/Response
Volatile Organic Compounds (VOCs) (Monitoring Via Photoionization Detector and Odor Observation)	< 5 ppm	1. Resume work with continuing monitoring.
	5 ppm < level < 25 ppm	1. Work activities must be temporarily halted, source vapors must be identified, suppression techniques employed to abate emissions and monitoring continued. 2. After these steps, if VOC levels (200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or structure, whichever is less) is below 5 ppm over background, resume work.
	> 25 ppm	1. Identified contributing ground intrusive activities must be halted and vapor suppression techniques must be evaluated and modified until monitoring indicates VOC levels below the action level. 2. After these steps, if VOC levels (half the distance to the nearest potential receptor or structure) are below 5 ppm over background, resume work.
Particulates (Monitoring Via Particulate Meter and Observation)	< 100 ug/m^3	1. If dust is observed leaving the work area, then dust control techniques must be implemented or additional controls used.
	100 ug/m3 < level < 150 ug/m^3	1. Employ dust suppression techniques. 2. Work may continue with dust suppression techniques provided that downwind PM-10 particulate concentration do not exceed 150 ug/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
	> 150 ug/m^3	1. STOP work 2. Re-evaluate activities, modify dust suppression techniques. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

* Instantaneous readings above background. Particulate readings are based on the respirable (PM-10) fraction. Background readings are taken at upwind locations relative to Work Areas or Exclusion Zones.

APPENDIX

A. Action Limit Report

APPENDIX A

Action Limit Report

ACTION LIMIT REPORT

Project Location: Peninsula Redevelopment Project, 1221 Spofford Avenue, Bronx, NY

Date: _____ Time: _____

Name: _____

Contaminant: PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: _____ Location: _____ Level Reported: _____

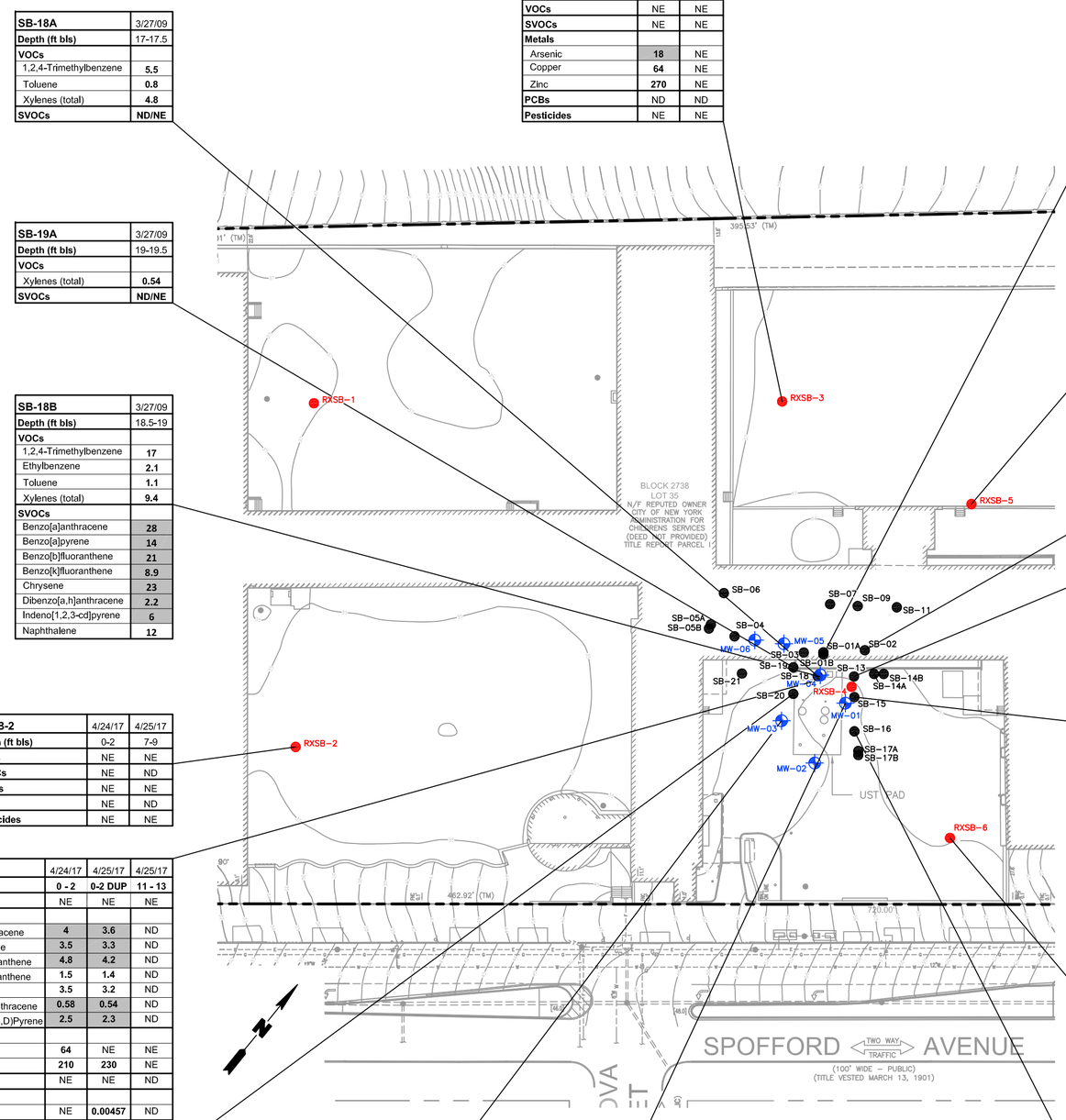
Monitor ID#: _____ Location: _____ Level Reported: _____

ACTIVITY DESCRIPTION

CORRECTIVE ACTION TAKEN

PLATE

1. Soil Exceedances



SB-18A	3/27/09
Depth (ft bls)	17-17.5
VOCs	
1,2,4-Trimethylbenzene	**5.5**
Toluene	**0.8**
Xylenes (total)	**4.8**
SVOCs	**ND/NE**

SB-19A	3/27/09
Depth (ft bls)	19-19.5
VOCs	
Xylenes (total)	**0.54**
SVOCs	**ND/NE**

SB-18B	3/27/09
Depth (ft bls)	18.5-19
VOCs	
1,2,4-Trimethylbenzene	**17**
Ethylbenzene	**2.1**
Toluene	**1.1**
Xylenes (total)	**9.4**
SVOCs	
Benzo[a]anthracene	**28**
Benzo[a]pyrene	**14**
Benzo[b]fluoranthene	**21**
Benzo[k]fluoranthene	**8.9**
Chrysene	**23**
Dibenzo[a,h]anthracene	**2.2**
Indeno[1,2,3-cd]pyrene	**6**
Naphthalene	**12**

RXSB-3	4/25/17	4/26/17
Depth (ft bls)	0-2	6-8
VOCs	NE	NE
SVOCs	NE	NE
Metals		
Arsenic	**18**	NE
Copper	**64**	NE
Zinc	**270**	NE
PCBs	ND	ND
Pesticides	NE	NE

SB-01B	3/24/09
Depth (ft bls)	1.0-1.5
VOCs	
1,2,4-Trimethylbenzene	**6.8**
n-Propylbenzene	**5.6**
Xylenes (total)	**0.29**
SVOCs	**ND/NE**

RXSB-5	4/25/17	4/26/17
Depth (ft bls)	0-2	5-6
VOCs	NE	NE
SVOCs	NE	ND
Metals		
Zinc	**120**	NE
PCBs	ND	ND
Pesticides		
4,4'-DDD	ND	**0.0618**
4,4'-DDE	NE	**0.0766**
4,4'-DDT	NE	**0.513**

SB-02A	3/24/09
Depth (ft bls)	0.5-1.0
VOCs	
n-Propylbenzene	**8.1**
sec-Butylbenzene	**11**
Xylenes (total)	**0.63**
SVOCs	**ND/NE**

SB-13A	3/26/09
Depth (ft bls)	11.5-12
VOCs	
1,2,4-Trimethylbenzene	**7.1**
Xylenes (total)	**4.1**
SVOCs	**ND/NE**

SB-15A	3/26/09
Depth (ft bls)	15-15.5
VOCs	
1,2,4-Trimethylbenzene	**190**
1,3,5-Trimethylbenzene	**53**
Ethylbenzene	**26**
Napthalene	**85**
n-Butylbenzene	**18**
n-Propylbenzene	**28**
sec-Butylbenzene	**18**
Toluene	**24**
Xylenes (total)	**151**
SVOCs	
Acenaphthene	**32**
Naphthalene	**120**

RXSB-2	4/24/17	4/25/17
Depth (ft bls)	0-2	7-9
VOCs	NE	NE
SVOCs	NE	ND
Metals	NE	NE
PCBs	NE	ND
Pesticides	NE	NE

RXSB-4	4/24/17	4/25/17	4/25/17
Depth (ft bls)	**0 - 2**	**0-2 DUP**	**11 - 13**
VOCs	NE	NE	NE
SVOCs			
Benzo(a)Anthracene	**4**	**3.6**	ND
Benzo(a)Pyrene	**3.5**	**3.3**	ND
Benzo(b)Fluoranthene	**4.8**	**4.2**	ND
Benzo(k)Fluoranthene	**1.5**	**1.4**	ND
Chrysene	**3.5**	**3.2**	ND
Dibenz(A,H)Anthracene	**0.58**	**0.54**	ND
Indeno(1,2,3-C,D)Pyrene	**2.5**	**2.3**	ND
Metals (mg/kg)			
Lead	**64**	NE	NE
Zinc	**210**	**230**	NE
PCBs	NE	NE	ND
Pesticides			
4,4'-DDD	NE	**0.00457**	ND

RXSB-6	4/24/17	4/25/17
Depth (ft bls)	0-2	8-10
VOCs	NE	NE
SVOCs		
Benzo[a]anthracene	**1.5**	ND
Benzo[b]fluoranthene	**1.4**	ND
Chrysene	**1.3**	ND
Indeno[1,2,3-cd]pyrene	**0.58**	ND
Metals		
Copper	**190**	**72**
Lead	**159**	NE
Zinc	**1200**	**440**
PCBs	NE	ND
Pesticides	NE	ND

SB-20A	3/27/09
Depth (ft bls)	17-17.5
VOCs	**ND/NE**
SVOCs	
Benzo[a]anthracene	**28**
Benzo[a]pyrene	**16**
Benzo[b]fluoranthene	**25**
Benzo[k]fluoranthene	**9.5**
Chrysene	**26**
Dibenzo[a,h]anthracene	**2.3**
Indeno[1,2,3-cd]pyrene	**6.4**

MW-03	9/2014	9/2014
Depth (ft bls)	11-13	16-18
Total Volatiles	1,146	72,945
Naphthalene	**0.24**	**24**

MW-01	9/2014	9/2014
Depth (ft bls)	11-13	13-15
Total Volatiles	1,542	76,300
Naphthalene	**0.46**	**18**

SB-16A	3/26/09
Depth (ft bls)	15.5-16
VOCs	
1,2,4-Trimethylbenzene	**790**
1,3,5-Trimethylbenzene	**180**
Ethylbenzene	**120**
Napthalene	**390**
n-Butylbenzene	**60**
n-Propylbenzene	**110**
sec-Butylbenzene	**68**
Toluene	**120**
Xylenes (total)	**730**
SVOCs	
Acenaphthene	**37**
Naphthalene	**120**

LEGEND

- SITE BOUNDARY
- SB–06 — SOIL BORING LOCATION FROM LOUIS BERGER AND ASSOC., P.C., 2009 INVESTIGATION
- MW–03 — MONITORING WELL LOCATION INSTALLED BY URS 2014
- RXSB–3 — APPROXIMATE SOIL BORING LOCATION FROM ROUX ASSOCIATES 2017 INVESTIGATION

Parameter	UUSCOs* mg/kg (ppm)	RRSCOs** mg/kg (ppm)
VOCs		
1,2,4-Trimethylbenzene	**3.6**	**52**
1,3,5-Trimethylbenzene	**8.4**	**52**
Ethylbenzene	**1**	**41**
Napthalene	**12**	**100**
n-Butylbenzene	**12**	**100**
n-Propylbenzene	**3.9**	**100**
sec-Butylbenzene	**11**	**100**
tert-Butylbenzene	**5.9**	**100**
Toluene	**0.7**	**100**
Xylenes (total)	**0.26**	**100**
SVOCs		
Acenaphthene	**20**	**100**
Benzo[a]anthracene	**1**	**1**
Benzo[a]pyrene	**1**	**1**
Benzo[b]fluoranthene	**1**	**1**
Benzo[k]fluoranthene	**0.8**	**3.9**
Chrysene	**1**	**3.9**
Dibenzo[a,h]anthracene	**0.33**	**0.33**
Fluoranthene	**100**	**100**
Indeno[1,2,3-cd]pyrene	**0.5**	**0.5**
Naphthalene	**12**	**100**
Metals		
Arsenic	**13**	**16**
Copper	**50**	**270**
Lead	**63**	**400**
Zinc	**109**	**10000**
Pesticides		
4,4'-DDD	**0.0033**	**13**
4,4'-DDE	**0.0033**	**8.9**
4,4'-DDT	**0.0033**	**7.9**

CONCENTRATIONS IN mg/kg

mg/kg – MILOGRAMS PER KILOGRAM
* – NYSDEC PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (UUSCOs)
** – PART 375 RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVES (RRSCOs)
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
VOCS – VOLATILE ORGANIC COMPOUNDS
SVOCS – SEMIVOLATILE ORGANIC COMPOUNDS
NE – NO EXCEEDANCES
ND – NO DETECTION
FT BLS – FEET BELOW LAND SURFACE

– RESULTS SHOWN IN BLACK TYPE EXCEED NYSDEC PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES

– RESULTS WITH GRAY BACKGROUND EXCEED NYSDEC PART 375 RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVES

NOTE

ONLY TOTAL VOLATILES SUMMARY AND NAPHTHALENE DATA RESULTS PROVIDED IN URS REPORT.

SOURCE:

LOUIS BERGER & ASSOC., P.C. REMEDIAL ACTION PLAN, 2010

URS, GROUNDWATER MONITORING AND REMEDIATION REPORT FOR THE FOURTH QUARTER 2016.

50' 0 50'

Title:

SOIL EXCEEDANCES

1221 SPOFFORD AVENUE
BRONX, NEW YORK

Prepared For:

THE PENINSULA JV, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.S.	Date: 15JUN17	PLATE
Prepared by: G.M.	Scale: AS SHOWN	
Project Mgr: F.C.	Project: 2611.0002Y000	1
File: 2611.0002Y104.01.DWG		

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