



January 23, 2014

New York City Office of Environmental Remediation  
City Voluntary Cleanup Program  
c/o Shaminder Chawla  
100 Gold Street, 2<sup>nd</sup> Floor  
New York, NY 10038

**Re:** 13CVCP144K  
E-Des # 13EHAZ197K  
498 Leonard Street  
Remedial Action Work Plan (RAWP) Stipulation List

Dear Mr. Chawla:

GRANT Engineering of New York hereby submits a Remedial Action Work Plan (RAWP) Stipulation List for the Site to the New York City Office of Environmental Remediation (OER) on behalf of Mr. Jack Fung of East Star Realty LLC. This letter serves as an addendum to the RAWP to stipulate additional content, requirements, and procedures that will be followed during the site remediation. The contents of this list are added to the RAWP and will supersede the content in the RAWP where there is a conflict in purpose or intent. The additional requirements/procedures include the following Stipulation List below:

1. The entire site will be excavated to 13 feet below grade (ftbg), with additional excavation in locations where further pockets of contamination is observed. Clean backfill will be placed onsite, following excavation to 13 ftbg, to achieve subgrade of cellar foundation/slab units.
2. The criterion attached in **Appendix 1** will be utilized if additional petroleum containing tank or vessel is identified during the remedial action or subsequent redevelopment excavation activities. All petroleum spills will be reported to the NYSDEC hotline as required by applicable laws and regulations. This contingency plan is designed for heating oil tanks and other small or moderately sized storage vessels. If larger tanks, such as gasoline storage tanks are identified, OER will be notified before this criterion is utilized.
3. A pre-construction meeting is required prior to start of remedial excavation work at the site. A pre-construction meeting will be held at the site and will be attended by OER, the developer or developer representative, the consultant, excavation/general contractor, and if applicable, the soil broker.
4. A pre-approval letter from all disposal facilities will be provided to OER prior to any soil/fill material removal from the site. Documentation specified in the RAWP -

Appendix 3 - Section 1.6 "Materials Disposal Off-Site" will be provided to OER. If a different disposal facility for the soil/fill material is selected, OER will be notified immediately.

5. A CD containing the final RAWP including this approved Stipulation List will be placed in the library that constitutes the primary public repository for project documents.
6. Signage for the project will include a sturdy placard mounted in a publically accessible right of way to building and other permits signage will consist of the NYC VCP Information Sheet (attached **Appendix 2**) announcing the remedial action. The Information sheet will be laminated and permanently affixed to the placard.
7. In the event that hazardous waste is identified during the remedial action or subsequent redevelopment excavation activities at this NYC VCP project, and removal and transportation of hazardous waste becomes necessary, the project may be subject to the New York State Department of Environmental Conservation's Special Assessment Tax (ECL 27-0923) and Hazardous Waste Regulatory Fees (ECL 72-00402). See DEC's website for more information: <http://www.dec.ny.gov/chemical/9099.html>.
8. Collection and analysis of 22 end-point samples from the bottom of the excavation will be collected to evaluate the performance of the remedy with respect to attainment of Track 4 SCOs. A map indicating end-point sampling locations is attached in **Appendix 3**. Samples will be analyzed for contaminants of concern [SVOCs, Metals and Pesticides].
9. **Appendix 4** includes Vapor Barrier Pre-Certification letter from Vapor Barrier manufacturer stating that the proposed vapor barrier system mitigates against the contaminants of concern at the site. Appendix 4 also includes Vapor Barrier product information. Also included in Appendix 4 is information on a waterproofing membrane in the event that this is implemented since the excavation/bottom of proposed foundation is extending into the groundwater table. The waterproofing membrane will consist of Preprufe 300R (46 mil) waterproofing membrane system installed beneath the new horizontal concrete building slabs (cellar-level and at street-grade), and Preprufe 160R (21-mil) will be installed along vertical foundation basement walls, and pits to grade. A Site-specific compatibility letter for the product will be provided prior to the start of the Remedial Action at the Site.
10. OER requires parties seeking City Brownfield Incentive Grants to carry insurance. For a cleanup grant, both the excavator and the trucking firm(s) that handle removal of soil must carry or be covered under a commercial general liability (CGL) policy that provides \$1 million per claim in coverage. OER recommends that excavators and truckers also carry contractors pollution liability (CPL) coverage, also providing \$1 million per claim in coverage. The CGL policy, and the CPL policy if obtained, must name the City of New York, the NYC Economic Development Corporation, and Brownfield Redevelopment Solutions as additional insured. For an investigation grant, an environmental consultant must be a qualified vendor in the BIG program and carry \$1

million of professional liability (PL) coverage. A fact sheet regarding insurance is attached as **Appendix 5**.

11. Daily report will be provided during active excavation work. If no work is performed for extended time period, daily report frequency will be reduced to weekly basis. Daily report template is attached in **Appendix 6**.
12. A minimum of 20-millimeter vapor barrier will be installed beneath the structure's slab and along foundation sidewalls. The barrier chosen for this project is VaporBlock PLUS VBP20 and is manufactured by Raven Industries. Appendix 7 provides PE/RA certified building plans with the extent of the vapor barrier installation details (penetrations, joints, etc.) with respect to the proposed foundation, footings, etc. The waterproofing membrane specifications, design (cross-section and plan showing horizontal extent), for the proposed product (if implemented) are also attached as part of Appendix 7.
13. An engineered composite site cover will be placed over the entire footprint of the Site. The composite cover system will be comprised of concrete foundation/slabs. Drawings of the composite site cover are provided as **Appendix 8**.
14. Truck route is included in **Appendix 9**.
15. Dewatering will be performed in full compliance with applicable laws, rules and regulations.
16. Development plans are attached in **Appendix 10**.
17. CHASP attached in **Appendix 11**.
18. The groundwater at the site will be remediated in accordance with the Groundwater Treatment and Monitoring Plan submitted to NYSDEC and attached in **Appendix 12**.

Sincerely,

Stephen Morse, PE  
President  
GRANT engineering

Cc: William Wong, NYCOER

**Appendix 1**  
Generic Procedures for Management of Underground Storage Tanks  
Identified under the NYC VCP

Prior to Tank removal, the following procedures should be followed:

- Remove all fluid to its lowest draw-off point.
- Drain and flush piping into the tank.
- Vacuum out the “tank bottom” consisting of water product and sludge.
- Dig down to the top of the tank and expose the upper half.
- Remove the fill tube and disconnect the fill, gauge, product, vent lines and pumps. Cap and plug open ends of lines.
- Temporarily plug all tank openings, complete the excavation, remove the tank and place it in a secure location.
- Render the tank safe and check the tank atmosphere to ensure that petroleum vapors have been satisfactorily purged from the tank.
- Clean tank or remove to storage yard for cleaning.
- If the tank is to be moved, it must be transported by licensed waste transporter. Plug and cap all holes prior to transport leaving a 1/8 inch vent hole located at the top of the tank during transport.
- After cleaning, the tank must be made acceptable for disposal at a scrap yard, cleaning the tanks interior with a high pressure rinse and cutting the tank in several pieces.

During the tank and pipe line removal, the following field observations should be made and recorded:

- A description and photographic documentation of the tank and pipe line condition (pitting, holes, staining, leak points, evidence of repairs, etc.).
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation, with a calibrated photoionization detector (PID).

Impacted Soil Excavation Methods

The excavation of the impacted soil will be performed following the removal of the existing tanks. Soil excavation will be performed in accordance with the procedures described under Section 5.5 of Draft DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation, with calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined in the field, and will depend on the horizontal and vertical extent of contaminated soils as indentified through physical examination (PID response, odor, staining, etc.). Collection of verification samples will be performed to evaluate the success of the removal action as specified in this document.

The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the Health and Safety Plan.

- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated.
- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile, or dispose of, separate from the impacted soil.
- If additional UST's are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued trenching around the perimeter to minimize its disturbance.
- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc.) an attempt will be made to remove it, to the extent not limited by the site boundaries or the bedrock surface. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separated dedicated plastic sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present.
- Excavated soils which are temporarily stockpiled on-site will be covered with tarp material while disposal options are determined. Tarp will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property.

Once the site representative and regulatory personnel are satisfied with the removal effort, verification of confirmatory samples will be collected from the excavation in accordance with DER-10.

**Appendix 2**  
NYC VCP Signage



## **NYC Voluntary Cleanup Program**

**498 Leonard Street  
Site #: 13CVCP144K**

This property is enrolled in the New York City Voluntary Cleanup Program for environmental remediation. This is a voluntary program administered by the NYC Office of Environmental Remediation.

Or scan with smart phone:

For more information,  
log on to: [www.nyc.gov/oer](http://www.nyc.gov/oer)



If you have questions or would like more information,  
please contact:

Shaminder Chawla at (212) 442-3007  
or email us at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov)

**Appendix 3**  
End-Point Sampling Map

# NOTES

Removal actions under this plan will be performed in conjunction with confirmation end-point sampling as per the Remedial Action Work Plan, dated July 31, 2013. Post-excavation end-point sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Track 4 Site-Specific SCOs, samples will be collected and analyzed for trigger compounds and elements established on the Track 4 Site-Specific SCO list. The approximate collection location of the six endpoint soil samples is shown on the figure. The end-point sampling and testing will be performed promptly following excavation and will be completed prior to any Site development activities. In addition, hotspot removal actions will be performed in conjunction with remedial end point sampling at a frequency which will consist of the following:

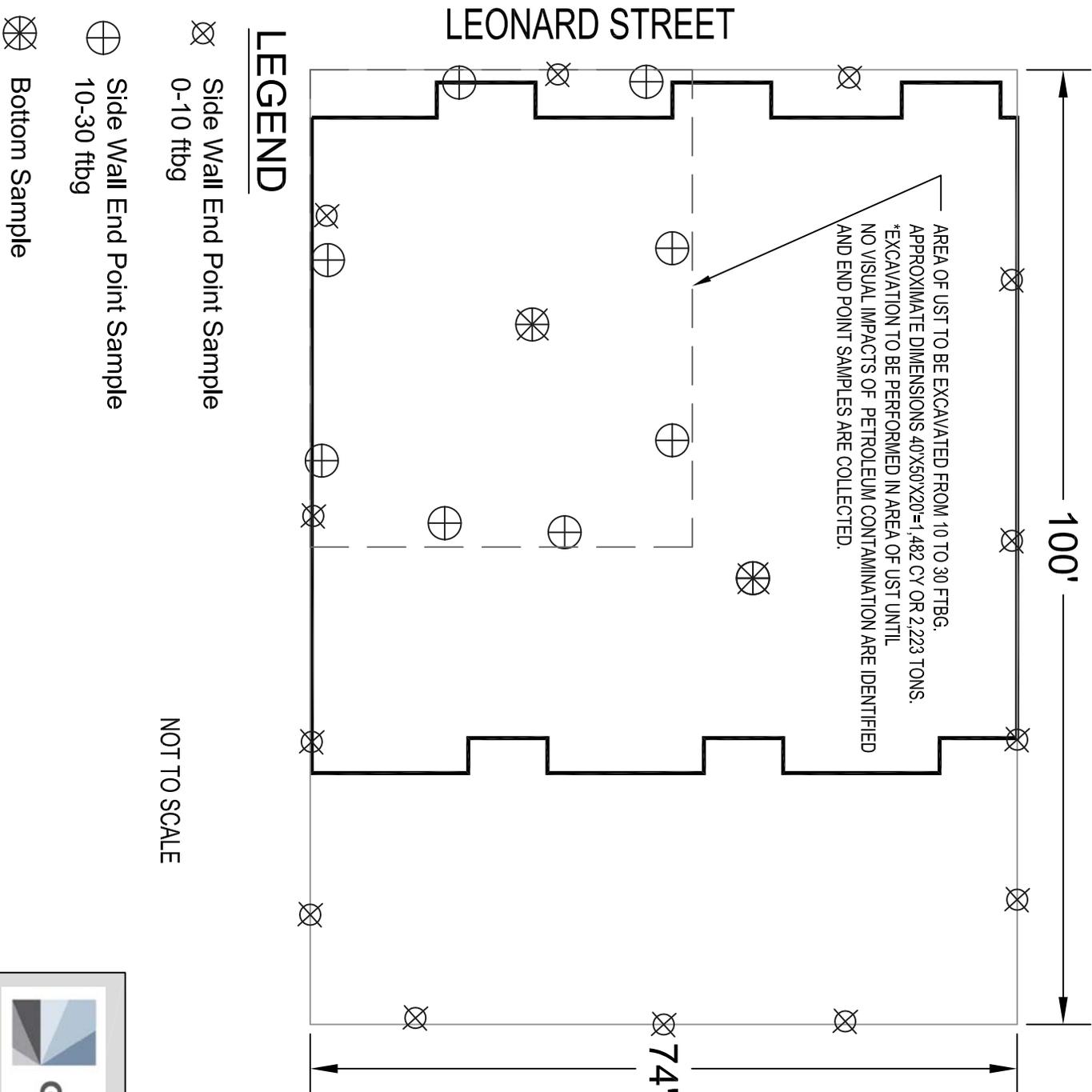
1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff;
2. For excavations 20 to 300 feet in perimeter:
  - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
  - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to 6-inch interval at the excavation floor. Samples taken after 24 hours should be taken at 6 to 12 inches.
4. For contaminated soil removal, post-remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased towards locations and depths of the highest expected contamination. New York State ELAP certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values.

End-point samples will be analyzed for trigger analytes (those for which SCO exceedances are identified utilizing the following methodology):

- Volatile Organic Compounds by EPA Method 8260;
- Semi-volatile Organic Compounds by EPA Method 8270;
- Target Analyte List Metals; and
- Pesticides/Herbicides/PCBs by EPA Method 8081/8321/8092.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and "fingerprint analysis" and required regulatory reporting (i.e. spills hotline) will be performed.



## LEGEND

- ⊗ Side Wall End Point Sample  
0-10 ftbg
- ⊕ Side Wall End Point Sample  
10-30 ftbg
- ⊗ Bottom Sample

NOT TO SCALE



**GRANT**  
engineering

498 LEONARD STREET  
BROOKLYN, NY 11222  
END POINT SAMPLING PLAN

**Appendix 4**  
Vapor Barrier Pre-Certification Letter and Product Information  
Waterproofing membrane Product Information



Stephen A Morse  
GRANT engineering  
139 Fulton Street, Suite 907  
New York, NY 10038

September 23, 2013

Re: 498 Leonard Street, Brooklyn, NY

Dear Mr. Morse,

I have reviewed the following documents for the above referenced project:

Remedial Investigation Report, 498 Leonard Street, Brooklyn, NY  
NYC VCP Site Number: 13CVCP144K,  
NYC E-Designation Site Number: 13EHAZ197K  
Dated June 24, 2013 which includes,

Table 3 - Soil Sample Results  
Table 4 - Groundwater Sample Results  
Table 5 - Soil Vapor Results

The identified contaminants at the levels reported will not have an adverse effect on the vapor barrier properties of the proposed 20-mil thick, "VaporBlock PLUS" vapor barrier liner system, manufactured by Raven Industries, Inc., provided standard design and installation procedures are followed. Standard installation instructions and details can be found on our website at [www.ravenfd.com](http://www.ravenfd.com). Raven VaporBlock Plus is not intended for primary waterproofing of structures with floors below the water table.

A handwritten signature in black ink that reads "Dan Smith". The signature is written in a cursive style with a large, looped initial "D".

Dan Smith  
Senior Development Engineer  
Raven Ind. Inc.  
(800) 635-3456  
dan.smith@ravenind.com

ENGINEERED FILMS DIVISION



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# VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier



## Product Description

VaporBlock® Plus™ 20 is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock® Plus™ 20 is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock® Plus™ 20 is more than 100 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs.

VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in a 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock® Plus™ 20 is produced within the strict guidelines of our ISO 9001:2008 Certified Management System.

## Product Use

VaporBlock® Plus™ 20 resists gas and moisture migration into the building envelop when properly installed to provide protection from toxic/harmful chemicals. It can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock® Plus™ 20 works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

## Size & Packaging

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.



Under-Slab Vapor/Gas Retarder

## Product

## Part #

VaporBlock Plus 20 ..... VBP 20

## APPLICATIONS

- |                 |                                |
|-----------------|--------------------------------|
| Radon Barrier   | Under-Slab Vapor Retarder      |
| Methane Barrier | Foundation Wall Vapor Retarder |
| VOC Barrier     |                                |

**VaporBlock® Plus™**  
UNDERSLAB VAPOR RETARDER / GAS BARRIER

# VAPORBLOCK® PLUS™ VBP20



Under-Slab Vapor / Gas Barrier

PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 20	
		IMPERIAL	METRIC
APPEARANCE		White/Gold	
THICKNESS, NOMINAL		20 mil	0.51 mm
WEIGHT		102 lbs/MSF	498 g/m <sup>2</sup>
CLASSIFICATION	ASTM E 1745	CLASS A, B & C	
TENSILE STRENGTH LBF/IN (N/CM) AVERAGE MD & TD (NEW MATERIAL)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
IMPACT RESISTANCE	ASTM D 1709	2600 g	
MAXIMUM USE TEMPERATURE		180° F	82° C
MINIMUM USE TEMPERATURE		-70° F	-57° C
PERMEANCE (NEW MATERIAL)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.0098 Perms grains/(ft <sup>2</sup> ·hr·in·Hg)	0.0064 Perms g/(24hr·m <sup>2</sup> ·mm Hg)
(AFTER CONDITIONING) PERMS (SAME MEASUREMENT AS ABOVE PERMEANCE)	ASTM E 154 Section 8, E96 Section 11, E96 Section 12, E96 Section 13, E96	0.0079 0.0079 0.0097 0.0113	0.0052 0.0052 0.0064 0.0074
WVTR	ASTM E 96 Procedure B	0.0040 grains/hr-ft <sup>2</sup>	0.0028 gm/hr-m <sup>2</sup>
RADON DIFFUSION COEFFICIENT	K124/02/95	< 1.1 x 10 <sup>-13</sup> m <sup>2</sup> /s	
METHANE PERMEANCE	ASTM D 1434	< 1.7 x 10 <sup>-10</sup> m <sup>2</sup> /d·atm 0.32 GTR (Gas Transmission Rate) ml/m <sup>2</sup> ·D·ATM	

## VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.  
Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.  
ASTM E-1643 also provides general installation information for vapor retarders.



VaporBlock® Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. RAVEN INDUSTRIES MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage. Limited Warranty available at [www.RavenEFD.com](http://www.RavenEFD.com)



Scan QR Code to download current technical data sheets via the Raven website.



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1/11 EFD 1125

## PREPRUFE® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

### Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

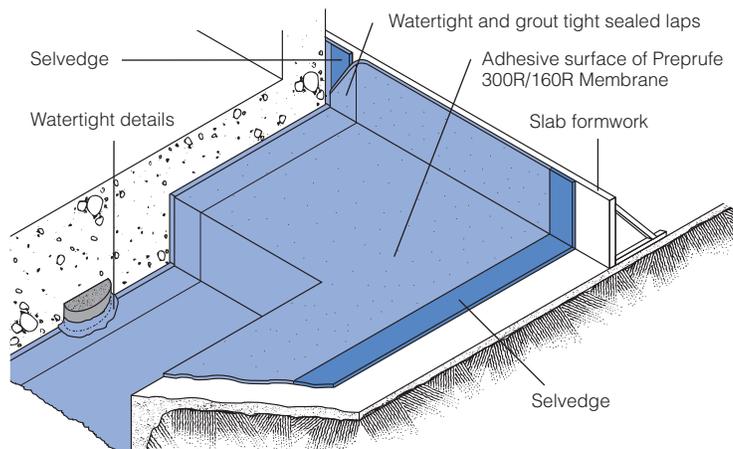
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Prococor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

### Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only. Please refer to [graceconstruction.com](http://graceconstruction.com) for specific application details.

## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [graceconstruction.com](http://graceconstruction.com). For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvage on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

### Substrate Preparation

**All surfaces**—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

**Horizontal**—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

**Vertical**—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe LT data sheet for more information.

**Horizontal substrates**—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvage. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvage using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to

overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges**—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 3). Immediately remove printed plastic release liner from the tape.

### Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [graceconstruction.com](http://graceconstruction.com). This manual gives comprehensive guidance and standard details.

### Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvage has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe membrane and tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

### Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1



Figure 2

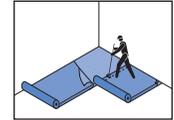
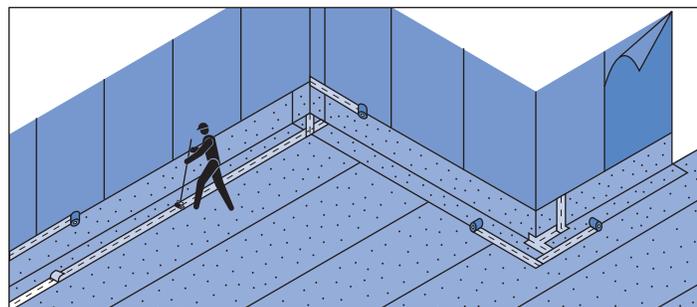
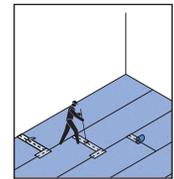


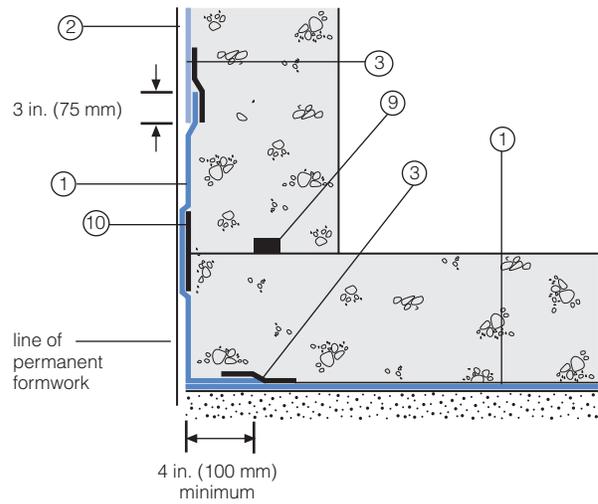
Figure 3



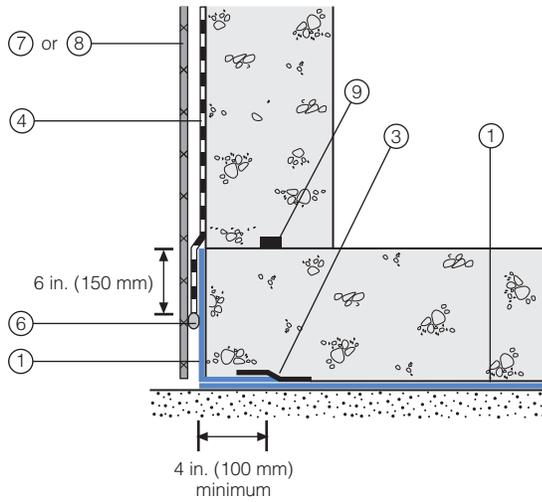
## Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com). For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

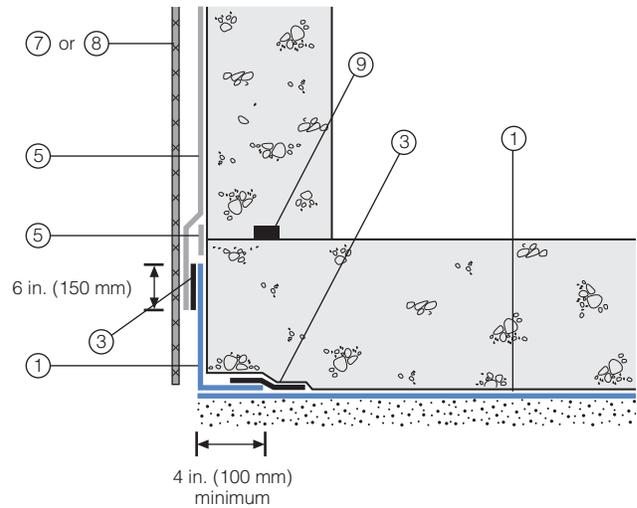
### Wall base detail against permanent shutter



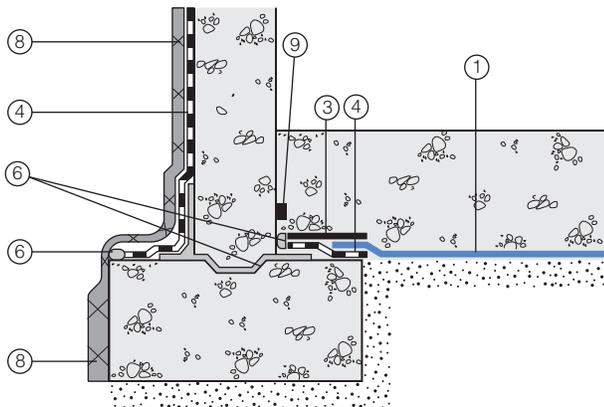
### Bituthene wall base detail (Option 1)



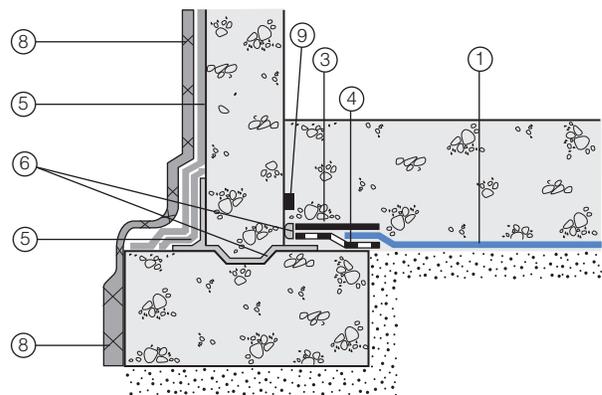
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



- 1 Preprufe 300R
- 2 Preprufe 160R
- 3 Preprufe Tape
- 4 Bituthene

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

- 8 Hydroduct®
- 9 Adcor ES
- 10 Preprufe CJ Tape

**Appendix 5**  
BIG Program Insurance Fact Sheet

## FACT SHEET – BIG PROGRAM INSURANCE REQUIREMENTS

**Investigation Grants** – for a developer or site owner to be eligible for a BIG investigation grant, its environmental consultant(s) must be:

- a Qualified Vendor in the BIG Program; and
- maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

**Cleanup Grants** – for a developer or site owner to be eligible for a BIG cleanup grant:

- Its general contractor or excavation/foundation contractor hired to perform remedial work must maintain Commercial General Liability (CGL) insurance of at least \$1M per occurrence and \$2M in the general aggregate. It is recommended that the general contractor or excavation/foundation contractor also maintain a Contractors Pollution Liability policy (CPL) of at least \$1M per occurrence.
- Its subcontractors who are hired by the general contractor etc. to perform remedial work at a site, including soil brokers and truckers, must also maintain a CGL policy in the amount and with the terms set forth above. It is recommended that subcontractors also maintain a CPL policy in the amount and with the terms set forth above.

The CGL policy, and the CPL policy if in force, must list the city, EDC and BRS as additional insureds, include completed operations coverage and be primary and non-contributory to any other insurance the additional insureds may have.

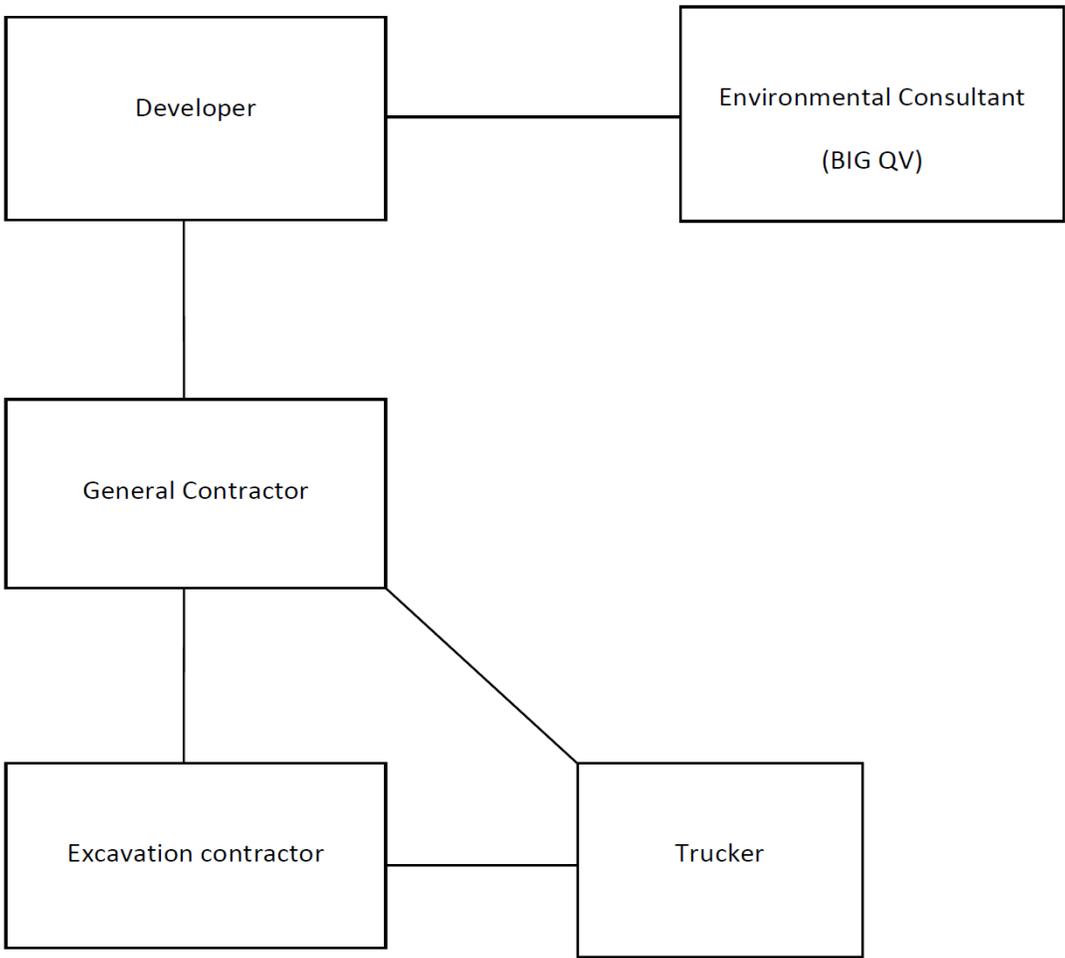
- Its environmental consultant(s) hired to oversee the cleanup must be:
  - a. a BIG Qualified Vendor; and
  - b. maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

If, in the alternative, the developer hires its environmental consultant to perform the cleanup, the environmental consultant must maintain CGL insurance in the amount and with the terms set forth above. It is recommended that the environmental consultant also maintain CPL coverage in the amount and with the terms set forth in the first two bulleted items listed above.

A schematic presenting the contractual relationships described above appears on page 2. Parties who must be named as Additional Insureds on Cleanup Grant insurance policies (CGL and CPL) are presented on page 3.

**Example of Contractual Relationships for Cleanup Work**

The Office of Environmental Remediation’s Voluntary Cleanup Plan program requires applicants to identify the parties who are engaged in active remediation of their sites including: the General Contractor hired to remediate and/or the excavation contractor hired to excavate soil from the site and the trucking firm(s) that remove soil from the site for disposal at approved facilit(ies).



The chart above shows contractual relationships that typically exist for projects that are enrolled in the Voluntary Cleanup Program.

**BIG Program Additional Insureds**

The full names and addresses of the additional insureds required under the Required CGL Policy and recommended CPL Policy are as follows:

“City and its officials and employees”

New York City Mayor’s Office of Environmental Remediation  
253 Broadway, 14th Floor  
New York, NY 10007

“NYC EDC and its officials and employees”

New York City Economic Development Corporation  
110 William Street  
New York, NY 10038

“BIG Grant Administrator and its officials and employees”

Brownfield Redevelopment Solutions, Inc.  
739 Stokes Road, Units A & B  
Medford, NJ 08055

**Appendix 6**  
Daily Report Template

## Generic Template for Daily Status Report

### Instructions

The Daily Status Report submitted to OER should adhere to the following conventions:

- Remove this cover sheet prior to editing.
- Remove all the **red text** and replace with site-specific information.
- Submit the final version as a Word or PDF file.

### Daily Status Reports

Daily status reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

# DAILY STATUS REPORT

Prepared By: Enter Your Name Here

WEATHER	Snow		Rain		Overcast		Partly Cloudy	X	Bright Sun	
TEMP.	< 32		32-50		50-70	X	70-85		>85	

VCP Project No.:	13CVCP144K	E-Number:	13EHAZ197K	Date:	01/01/2013
Project Name:	498 Leonard Street				

Consultant: Person(s) Name and Company Name	Safety Officer: Person(s) Name and Company Name
General Contractor: Person(s) Name and Company Name	Site Manager/ Supervisor: Person(s) Name and Company Name

Work Activities Performed (Since Last Report):  
Provide details about the work activities performed.

Working In Grid #: A1, B1, C1

Samples Collected (Since Last Report):  
No samples collected or provide details

Air Monitoring (Since Last Report):  
No air monitoring performed or provide details

Problems Encountered:  
No problems encountered or provide details

Planned Activities for the Next Day/ Week:  
Provide details about the work activities planned for the next day/ week.

									Example:	
Facility # Name/ Location Type of Waste Solid <u>Or</u> Liquid	Facility # Name Location Type of Waste Solid <u>Or</u> Liquid		##### Clean Earth Carteret, NJ petroleum soils Solid							
(Trucks, Cu.Yds. <u>Or</u> Gallons)	Trucks	Cu. Yds. <u>Or</u> Gallons	Trucks	Cu. Yds.						
Today									5	120
Total									25	600

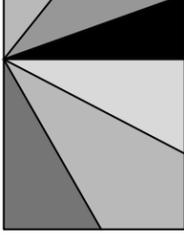
NYC Clean Soil Bank		Receiving Facility: Name/ Address (Approved by OER)			
Tracking No.:	13CCSB000				
Today	Trucks 5	Cu. Yds. 25	Total	Trucks 120	Cu. Yds. 600

Site Grid Map  
Insert the site grid map here

## Photo Log

Photo 1 – provide a caption	Insert Photo Here – Photo of the entire site
Photo 2 – provide a caption	Insert Photo Here – Photo of the work activities performed
Photo 3 – provide a caption	Insert Photo Here – Photo of the work activities performed

**Appendix 7**  
Vapor Barrier / Water Proofing Membrane Details and Plan



STEPHEN ANDREW MORSE, PE  
 NYS LICENSE #083918

**PROJECT NAME:**  
 Leonard Street

**ADDRESS:**  
 498 Leonard Street  
 Brooklyn, NY 11222

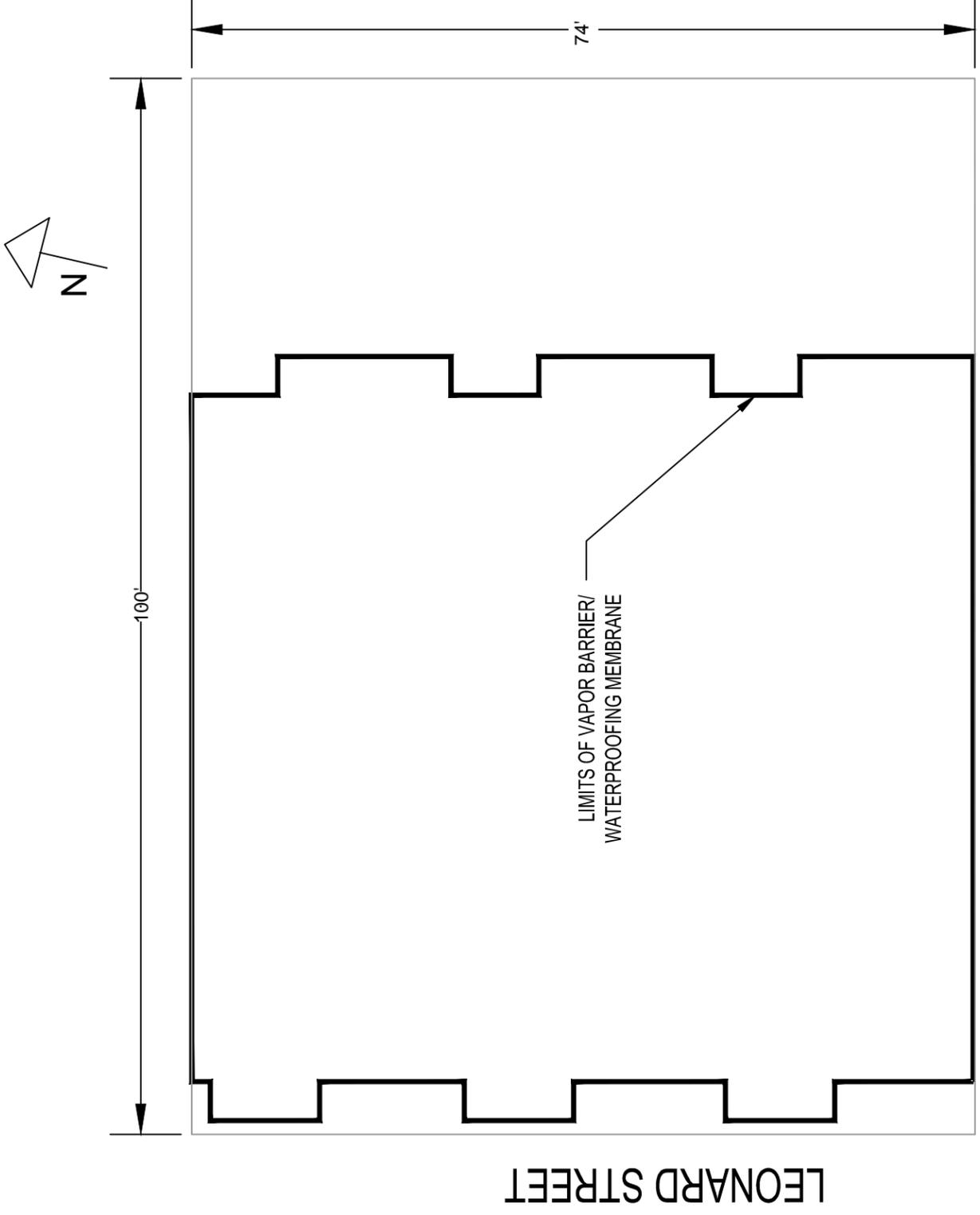
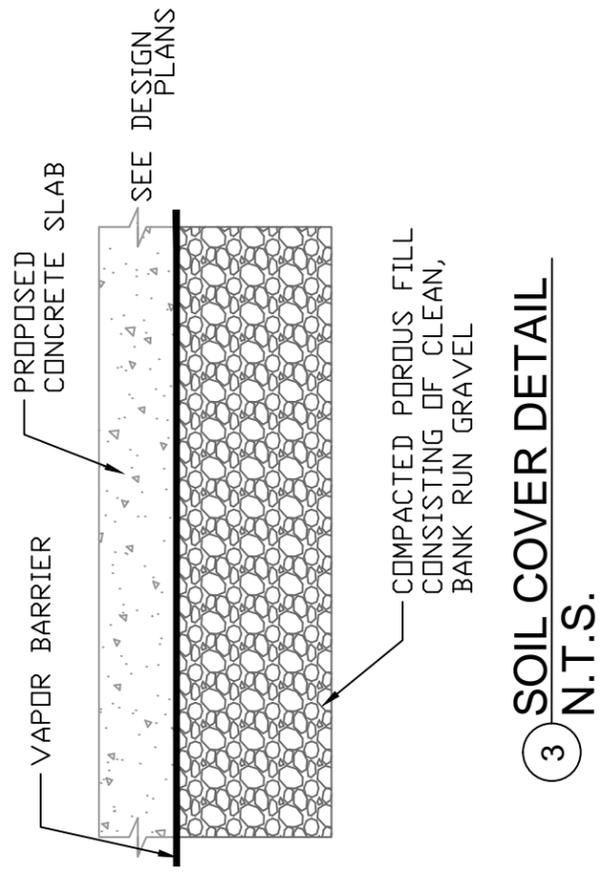
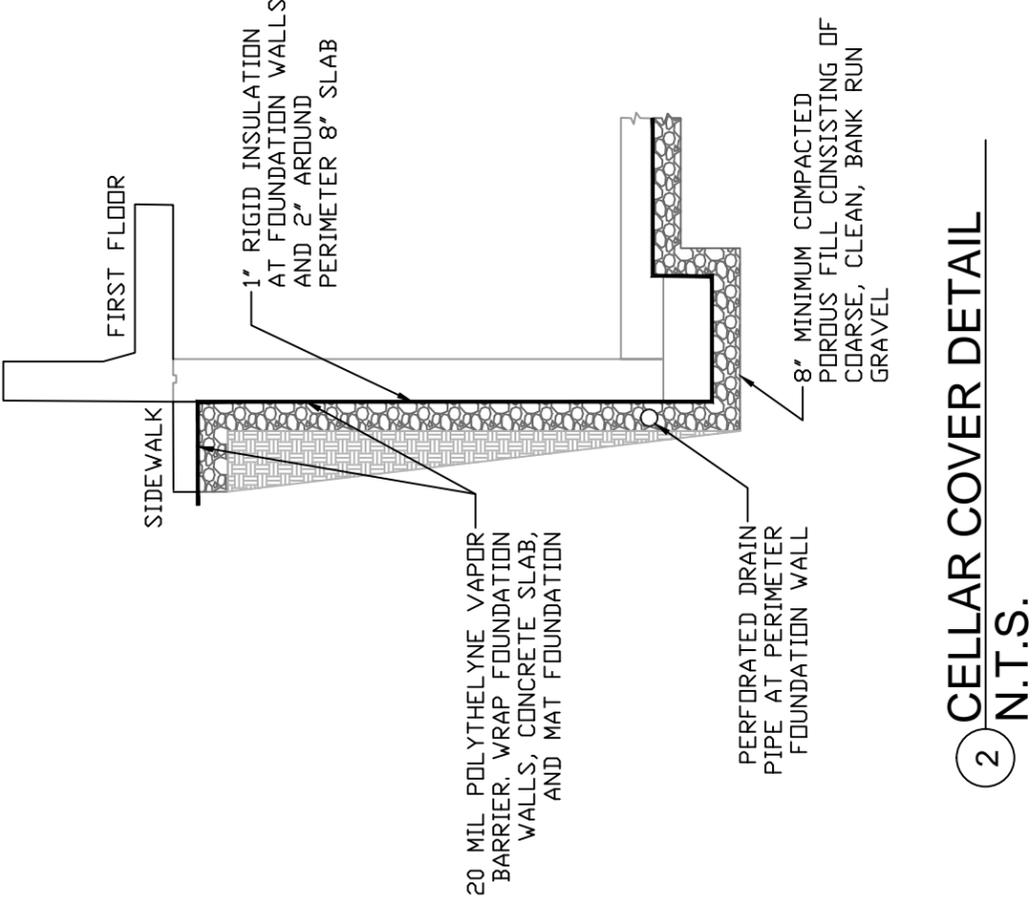
VAPOR BARRIER/  
 WATERPROOFING MEMBRANE  
 PLAN

**DATE:** 10/16/2013

**PAGE:** 1 OF 2

**SCALE:** N.T.S.

Drawn by: ESG

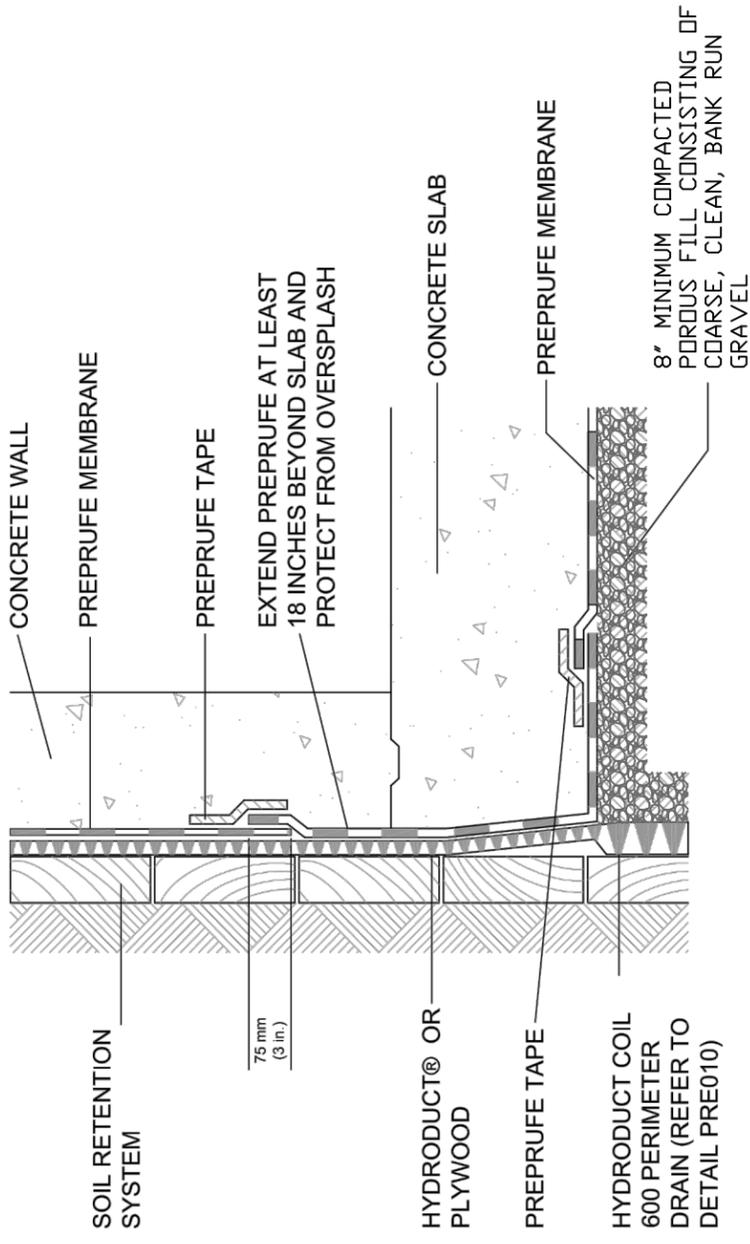


NOTE: FOP VAPOR BARRIER, SEE DETAILS 2 & 3. FOR WATERPROOFING MEMBRANE, SEE DETAILS 4 & 5 ON SHEET 2

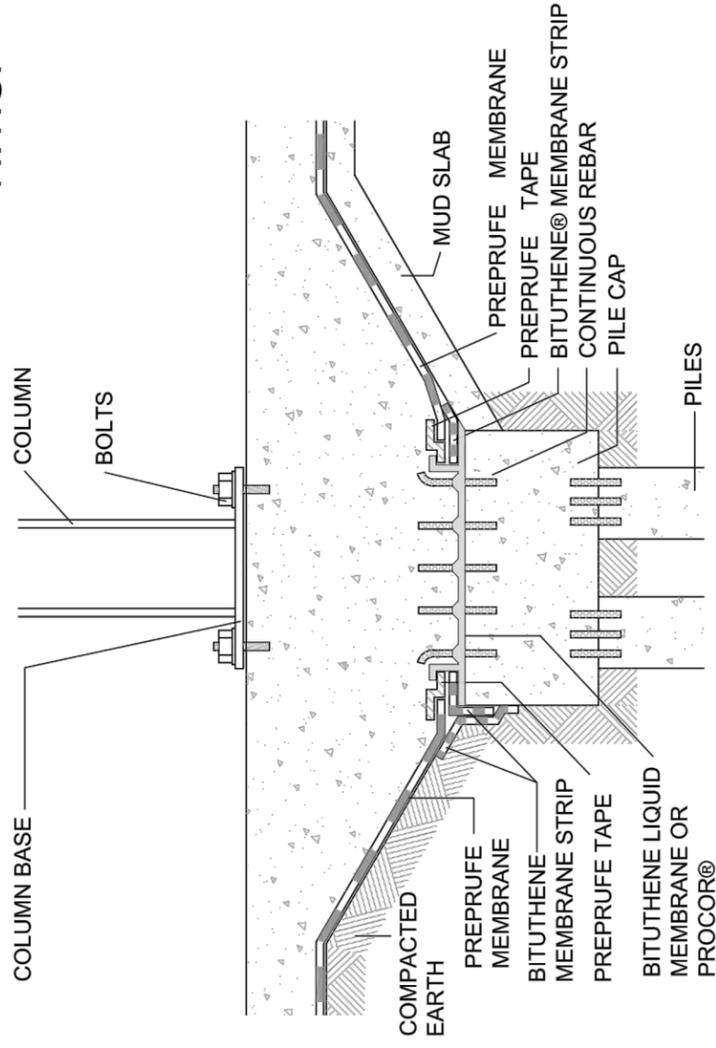
**1** VAPOR BARRIER BOUNDARY  
 N.T.S.

LEONARD STREET

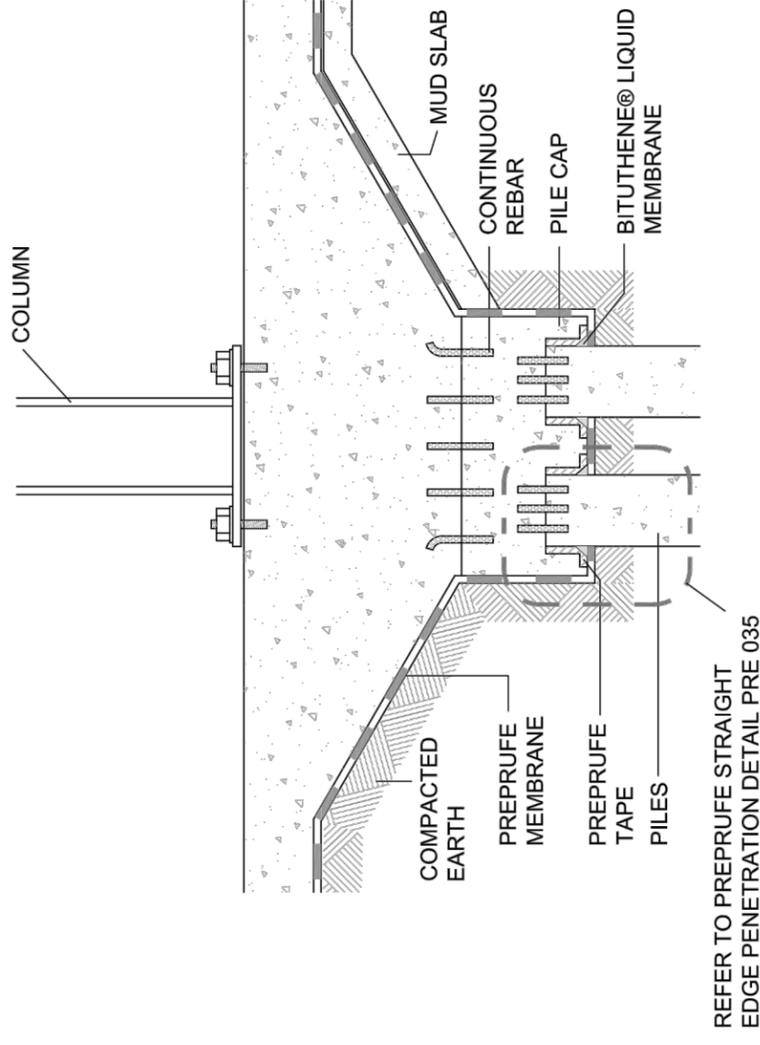
IF WATERPROOFING MEMBRANE IS IMPLEMENTED IN PLACE OF VAPOR BARRIER, CONTRACTOR TO INSTALL IN ACCORDANCE WITH THESE DETAILS. IF STRUCTURE IS TO BE SUPPORTED BY PILE FOUNDATIONS, WATERPROOFING MEMBRANE SHALL BE INSTALLED IN ACCORDANCE WITH DETAIL 5A OR DETAIL 5B.



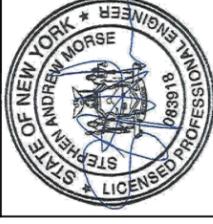
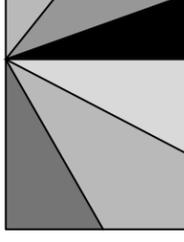
4 PREPRUFE MEMBRANE AT CELLAR LEVEL  
N.T.S.



5A PILE CAP CONFIGURATION OPTION 1  
N.T.S.



5B PILE CAP CONFIGURATION OPTION 2  
N.T.S.



STEPHEN ANDREW MORSE, PE  
NYS LICENSE #083918

PROJECT NAME:  
Leonard Street

ADDRESS:  
498 Leonard Street  
Brooklyn, NY 11222

VAPOR BARRIER/  
WATERPROOFING MEMBRANE  
PLAN

DATE: 10/16/2013

PAGE 2 OF 2

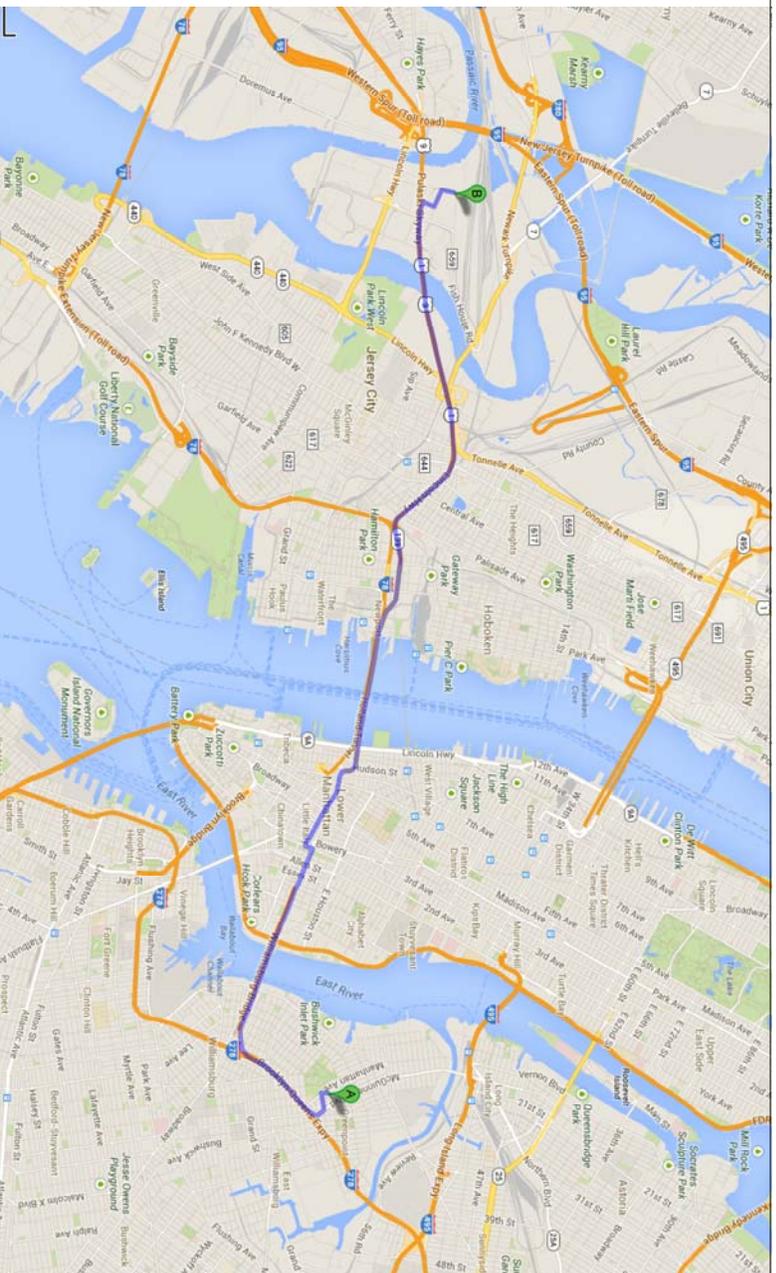
SCALE: N.T.S.

Drawn by: ESG

**Appendix 8**  
Composite Cover System



**Appendix 9**  
Truck Route Map



## DIRECTIONS

Project Site (498 Leonard St., Brooklyn, NY 11222) to Clean Earth of New Jersey, Inc. - 10.4 mi, 25 minutes

1. Head south on Leonard Street towards Engert Avenue - 295 ft
  2. Turn left onto Engert Ave - 0.2 mi
  3. Take the 3rd right onto McGuinness Blvd - 430 ft
  4. Merge onto I-278 W via the ramp to Bklyn-Ons Expy/Staten Island - 0.7 mi
  5. Take exit 32A on the left toward Williamsburg Bridge - 0.5 mi
  6. Merge onto Williamsburg Bridge - 0.3 mi
  7. Slight left to stay on Williamsburg Bridge - 1.1 mi
  8. Continue onto Delancy Street - 0.4 mi
  9. Turn left onto Chrysite Street - 377 ft
  10. Take 1st right onto Broome Street - 0.6 mi
  11. Slight left onto Watts Street - 0.3 mi
  12. Continue onto I-78 Holland Tunnel - 2.2 mi
  13. Keep left to continue on NJ-139 W - 1.4 mi
  14. Continue onto U.S. 1 S/U.S. 9 S - 1.7 mi
  15. Take the exit on the left toward South Kearny - 0.4 mi
  16. Turn right onto Adams Street - 0.1 mi
  17. Turn right onto 3rd Street - 0.2 mi
  18. Turn right onto Jacobus Ave , destination on left.
- Arrive: Clean Earth of New Jersey Inc.  
115 Jacobus Avenue  
Kearny, NY 07032



**GRANT**  
engineering

498 LEONARD STREET  
BROOKLYN, NY 11222

TRUCK ROUTE MAP

**Appendix 10**  
Development Plans

















**Appendix 11**  
Construction Health and Safety Plan

**CONSTRUCTION HEALTH & SAFETY PLAN (CHASP)**

**for**

**498 Leonard Street, Brooklyn, NY, 11222**

**Block 2698, Lot 11**



Prepared for:

Mr. Jack Fung

(917) 662-3803

And

Mayor's Office of  
Environmental Remediation

Prepared by:



**GRANT**  
engineering

137 Fulton Street, Suite 907 - New York, NY 10038

[www.GRANTpllc.com](http://www.GRANTpllc.com)

October 2013

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11. Legend for Figure 4 through 10
12. Route to Hospital Map

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1. Soil Analytical Data Summary
2. Groundwater Analytical Data Summary
3. Soil Vapor Analytical Data Summary

**APPENDICES**

Appendix A    MSDS Sheets

## 1.0 GENERAL SITE INFORMATION

Site Location: 498 Leonard Street  
City/Town: Brooklyn/New York  
County: Kings County  
State: New York

### 1.1 Site Description, Background and Known Contaminants

On behalf of the Mr. Jack Fung (the Client), GRANT engineering (GRANT) of Manhattan, New York has prepared this Construction Health and Safety Plan (CHASP) for the parcel located 498 Leonard Street in the Greenpoint section of Brooklyn, New York (hereinafter referred to as the “Site”). The Site is comprised of Block 2698, Lot 11. The map of the Site Location Plan is shown in Figure 1. A map of the site boundary is shown in Figure 2.

A Phase I ESA was conducted by GRANT, dated February 12, 2013, as part of a due diligence to support a potential purchase and redevelopment of the Site by the Client. The Site was previously used for factory and industrial purposes. The Site assessment was conducted by GRANT on February 5, 2013 and recorded surficial conditions only. The assessment included a walk-through of the site and surroundings. The Phase I ESA included a review of regulatory agency databases and historical documents and visual observations of the Site and adjoining properties. Review of the regulatory agency database indicated that the Site is listed as E-Designation for hazardous materials and is considered a REC. A leaking underground petroleum storage tank of No. 2 fuel oil on Site resulted in a NYSDEC Spill Case Number 1206982 opened on October 16, 2012. A spill from a leaking 5,000 gallon underground storage tank occurred on August 20, 2012 and resulted in a NYSDEC Spill Case Number 0212132. A spill of No. 2 fuel oil from a tank test failure occurred on Site in 2003 (NYSDEC Spill Case Number 0212132) and was closed in 2006. The leaking UST may have impacted soil, groundwater and/or soil vapor at the Site. All spills were identified at Brumar Sheet Metal Inc. located at 498 Leonard Street (the Site). The issue has yet to be reconciled and the tank is still listed as an open case in the LTANKS database and is considered a REC. The Site was listed on the New York City Department of City Planning (NYCDCP) list of e-designated properties. The NYC Office of Environmental Remediation (OER) is required to review and approve environmental investigation and environmental mitigation measures in order for a Certificate of Occupancy (COO) to be issued by New York City Department of Buildings (NYCDOB).

The Phase I identified RECs associated with the historic usage of the Site and surrounding properties. A Remedial Investigation (RI) was completed in order to evaluate areas of concern identified by the Phase I ESA. A site inspection for the RIR was conducted on January 17, 2013 by Mr. Stephen Morse and Ms. Liza Billings, EIT of GRANT. Mr. Stephen Morse was the Qualified Environmental Professional (QEP) evaluating potential areas of concern. The site inspection revealed that the Site is currently developed with the same existing structures described in the Phase I ESA.

A Phase II conducted by Hydro Tech Engineers (HTE) in October 2012 identified the presence of elevated SVOCs, metals and pesticides in surficial soil samples collected from the depth of 0-2 ftbg and elevated VOCs, SVOCs, metals, and pesticides in soil samples collected from 10-12 ftbg. The HTE Phase II also identified elevated VOCs, SVOCs, metals and pesticides in groundwater and elevated VOCs in soil vapor. Therefore, the following AOCs are identified for the site:

1. One (1) underground storage tank (UST) present in the southwest portion of the Site with two open NYSDEC Spill Case numbers 1206982 and 0212132.
2. Petroleum contaminated soil located throughout the Site from approximately 12 to 30 ft bg.

GRANT performed the following scope of work during the RI:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.); In February 2013, installed five (5) soil borings (SB-01 to SB-05) surrounding the underground storage tank in the southwest portion of the Site.
2. In April 2013, installed seven (7) soil borings (SB-06 to SB-12) across the entire project Site, and collected nineteen (19) soil samples for chemical analysis, and seven (7) of those samples had further finger printing analysis for determination of soil quality;
3. In April 2013, installed three (3) groundwater monitoring wells (TWP-01, TWP-02, and TWP-03) throughout the Site to establish groundwater flow and collected three (3) groundwater samples for chemical analysis to evaluate groundwater quality; and
4. Installed three (3) soil vapor probes (SVP-01, SV-02, and SVP-03) around the proposed future site perimeter and collected three (3) samples for chemical analysis. Figure 3 depicts the locations of the soil borings, temporary well points and soil vapor samples that were advanced during the RI.

### **Summary of Environmental Findings**

1. Depth to groundwater was present at approximately ten (10) feet below grade at the Site during the RIR. HTE installed 13 monitoring wells on the Site and adjacent sidewalk in October 2012. The monitoring wells were surveyed and groundwater table elevations were measured between 14.77 and 15.71.
2. Groundwater flow direction is generally from the south towards the north.
3. Bedrock was not encountered during the RI.
4. The stratigraphy of the site from the surface down consists of a layer of historic fill material from approximately 0 to 12 feet below grade (ftbg), sand, gravel and silt with heavy petroleum impacts from 12-16 ft bg, visible petroleum staining from 16-30 ft bg in the area of the UST and an impacted layer of highly compressible organic peat, clay and silt from 16-28 ft bg throughout the remainder of the Site and a highly compressible layer of clay/silt that appears to function as an hydraulic barrier at approximately 28-34 ft bg.
5. Soils during Phase 2: Five SVOC (all PAH) exceeded both Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential SCOs in two of 13 shallow soil samples. The maximum concentration of these exceedences was 1.440 ppm. Seven SVOCs, all PAH, exceeded Track 2 Restricted Residential Use SCOs in up to eight of 15 deep soil samples. A variety of petroleum derived VOCs were detected but were below Track 1 SCOs in shallow soil samples. Four VOC, all petroleum derived compounds, exceeded Track 1 Unrestricted Use SCOs in deep soil samples but did not exceed Track 2 Restricted Residential Use SCOs. Maximum concentration of these exceedences was 57.1 ppm. One pesticide (dieldrin; maximum concentration 255 ppb) was detected above Track 2 Restricted Residential SCOs and three pesticides were also detected only above Track 1 Unrestricted SCOs in 2 to 4 shallow soil samples. Two pesticides were detected above Track 1 SCOs in deep samples but did not exceed Track 2 Restricted Residential Use SCOs. The following metals were detected above Track 2 Restricted Residential SCOs: arsenic (2 shallow samples, maximum 59 ppm; 5 deep samples, maximum 41.5 ppm), barium (1 shallow sample, maximum 777 ppm; 3 deep samples, maximum 879 ppm), cadmium (9 shall samples, maximum 6.85 ppm; 6 deep samples, maximum 3.75 ppm), lead (9 shall samples, maximum 2020 ppm; 6 deep samples, maximum 5730 ppm), mercury (3 shallow samples, maximum 25.3 ppm; 4 deep samples, maximum 5.12 ppm). Chromium, copper and zinc also exceeded Track 1 Unrestricted Use SCOs but not Track 2 Restricted Residential SCOs in both shallow and deep soil samples.

6. Soils during RI: PCBs were not detected in soil samples collected during the Remedial Investigation. One VOC, acetone was detected in two (2) samples (at 160 µg/kg and 404 µg/kg), above the Unrestricted Use SCO but well below Restricted Residential Use SCO. SVOCs were detected in one sample (12-16 feet) above the Restricted Residential Use SCOs. They include benzo(a)anthracene (11,600 µg/kg), benzo(a)pyrene (11,700 µg/kg), benzo(b)fluoranthene (9,840 µg/kg), chrysene (9,670 µg/kg), dibenzo(a,h)anthracene (1,900 µg/kg) and indeno(1,2,3-cd)pyrene (5,910 µg/kg). Elevated levels of metals including arsenic, copper, lead, mercury, vanadium, and zinc were detected above the Unrestricted Use Soil Cleanup Objectives (SCOs), and of these, arsenic (74 mg/kg), lead (1,440 mg/kg) and mercury (31 mg/kg) also detected above Restricted Residential Use SCOs. One pesticide 4,4-DDD was detected (11-13 feet) at 54.9 µg/kg, above the Unrestricted Use SCO but below the Restricted Residential Use SCO. The Gas Chromatograph (GC) fingerprint analysis conducted on seven borings did not identify the presence of any compounds with the exception of mineral spirits. Soil sample results are provided in Table 1.  
 GW during Phase 2: Thirteen groundwater samples collected during the Phase II showed 13 VOC's, all petroleum derivatives, above groundwater quality standards (GQS). All were below 50 ppb except benzene derivatives, which had a maximum concentration of 544 ppb. Seven SVOC, all PAH compounds, were observed above GQS. The maximum concentration was for Phenanthrene at 503 ppb. Five groundwater samples showed arsenic (3 samples, maximum 193 ppb), barium (3 samples, maximum 1900 ppb) and lead (4 samples, maximum 84 ppb), and iron, manganese, magnesium and sodium above GWS. One pesticide, dieldrin, exceeded GQS (1 sample, 50 ppb).
7. Groundwater samples collected during the RI showed that SVOCs, pesticides and PCBs were not detected in the groundwater samples. Eight VOCs including 1,2,4-trimethylbenzene (7.7 ug/l), 1,2,4,5-trimethylbenzene (135 ug/l), tert-butylbenzene (43 ug/l), isopropylbenzene (70 ug/l), n-propylbenzene (121 ug/l), n-butylbenzene (63 ug/l), and sec-butylbenzene (160 ug/l) were detected above GQS of 5 ppb. Three metals including arsenic (25 ppb), lead (36 ppb), and mercury (1.6 ppb) were detected above GQS. Groundwater sample results are provided in Table 2.
8. Phase 2: One chlorinated VOC was detected in one of four soil vapor samples (PCE, 30 ug/m<sup>3</sup>). TCE, 111-TCA and carbon tetrachloride were not detected. These findings were below State DOH monitor levels. Five petroleum derivatives were also detected with maximum concentrations of up to 61 ug/m<sup>3</sup>.
9. RI: Soil vapor samples collected during the RI showed a variety of VOCs, including petroleum hydrocarbons and chlorinated VOCs. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected. Chlorinated VOCs including 1,1,1-trichloroethane (40 ug/m<sup>3</sup>), carbon tetrachloride (23 ug/m<sup>3</sup>), tetrachloroethylene (50 ug/m<sup>3</sup>), and trichloroethylene (20 ug/m<sup>3</sup>) were at concentrations that are below the monitoring level ranges established within the State DOH soil vapor guidance matrix. Soil vapor results are provided in Table 3.

Based on the results of the RIR the contaminants of concern are:

Soil:

- SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene exceeding Restricted Residential SCOs.

- Metals including arsenic (74 mg/kg), lead (1,440 mg/kg) and mercury (31 mg/kg) detected above Restricted Residential Use SCOs; and
- One pesticide 4,4-DDD was identified in soil but did not exceed Restricted Residential Use SCO.

Groundwater:

- VOCs consisting of 1,2,4-Trimethylbenzene, 1,2,4,5-Trimethylbenzene, tert-butylbenzene, isopropylbenzene, n-propylbenzene, n-butylbenzene, and sec-butylbenzene detected in groundwater samples above GQS.
- Dissolved phase metals arsenic, lead and mercury detected above their GQS.

Soil Vapor:

- Chlorinated VOCs including 1,1,1-trichloroethane, carbon tetrachloride, tetrachloroethylene, and trichloroethylene detected above monitoring level ranges established within the State DOH soil vapor guidance matrix.
- Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected at low levels.

**Nature, Extent, Fate and Transport of Contaminants**

Soil: A layer of fill material is present at the Site to a maximum depth of approximately 12 feet. Based on the results of the RI, metals and SVOCs are present throughout the Site in historical fill and petroleum contamination extends to depths of 28-34 ft bg, including contaminants above Track 2 Restricted Residential Use SCOs. Figure 4 identifies VOC contamination in soil at the Site. Figure 5 identifies SVOC contamination in soil at the Site. Figure 6 identified metals contamination in soil at the Site. Figure 7 identifies pesticide contamination in soil at the Site.

Groundwater: Metals arsenic, lead and mercury were found in dissolved phase groundwater samples above TOGS during the RI, indicating that the property may be contributing low level groundwater contamination. VOCs are present in groundwater throughout the Site. Based on the results of the RI, the VOCs 1,2,4-Trimethylbenzene, 1,2,4,5-Trimethylbenzene, tert-butylbenzene, isopropylbenzene, n-propylbenzene, n-butylbenzene, and sec-butylbenzene are present above TOGS standards. Based on the results of the HTE Phase II, the VOCs benzene, sec-butylbenzene, n-butylbenzene, ethylbenzene, isopropylbenzene, methyl-t-butyl-ether (MTBE), 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, o-xylene, m,p-xylene are present above TOGS standards. The elevated VOCs in groundwater may likely be the result of the active spills from the on-site UST in the southwest portion of the Site. Figure 8 identifies VOC, SVOC and pesticide contamination in the groundwater at the Site. Figure 9 identifies metals contamination in groundwater at the Site.

Soil Vapor: Chlorinated VOCs including 1,1,1-trichloroethane, carbon tetrachloride, tetrachloroethylene, and trichloroethylene detected above monitoring level ranges established within the State DOH soil vapor guidance matrix. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected at low levels. Figure 10 identifies VOC contamination in soil vapor at the Site. Figure 11 includes a legend of all symbols and references for Figure 4 through 10 in this report.

The Remedial Investigation (RI) was performed in order to investigate whether the historical on-Site and surrounding area land uses have impacted soil and groundwater at the Site and adequately identify and characterize the surface and subsurface soils and groundwater prior to construction and/or on-Site soil disturbance for worker health and safety and soil disposal purposes.

This CHASP has been prepared in prior to the start of any soil disturbance as part of the demolition and construction of a new residential development. This HASP will be submitted to NYCDEP for review and approval prior to construction.

### **1.2 Project Description**

The Site will be developed the Site with a multi-story residential building. The proposed plan is to demolish the existing structure and construct a multi-story residential building that is expected to include a 65' x 74' cellar. The proposed building is planned to be constructed starting from the property line along the length of Leonard Street and extending east. The remaining portion of the Site (35'x74' portion to the west) that will not be developed with the building footprint will be covered with concrete.

Remedial action proposed for the Site is identified in the Remedial Action Work Plan dated July 31, 2013. The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The preferred remedial action alternative is a Track 4 remedial action. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC BCP citizen participation activities according to an approved Citizen Participation Plan (CPP);
2. Performance of a Community Air Monitoring Plan (CAMP) for particulates and VOCs.
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs. Removal of arsenic and mercury hotspots;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs;
5. Removal of the 5,000 gallon on site underground storage tank (UST) containing No. 2 fuel oil and any other unknown sub-grade storage tanks that may be present and closure of the associated open petroleum spills (NYSDEC Spill Case numbers 1206982 and 0212132) under the authority of NYSDEC and in compliance with applicable local, State and Federal laws and regulations.
6. Sampling of groundwater monitoring wells and treatment of groundwater under the authority of NYS DEC to address petroleum contamination;
7. Capping with concrete building slab in all developed areas and with two feet of certified clean fill in landscaped areas to prevent human exposure to residual soil/fill remaining under the Site;
8. Installation of a vapor barrier system beneath the proposed cellar floor and walls of the Site building and an active sub-slab depressurization system to address migration of off-site soil vapors. Submittal of a Design Report for the vapor barrier system and sub slab depressurization system for OER approval prior to the start of development;
9. Demarcation of residual soil/fill;

10. Import of materials to be used for backfill and cover, as needed, in compliance with OER approved plan and in accordance with applicable Federal, State and City laws and regulations;
11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
12. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
13. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
16. Groundwater treatment to address the petroleum spill under NYS DEC authority;
17. Performance of groundwater sampling from all remaining monitoring wells after remediation is completed consistent with NYSDEC requirements for spill closure. If needed, additional means of groundwater remediation for may be required as determined by NYSDEC;
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities certifies including any changes from this RAWP, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all engineering and institutional controls to be implemented at the Site, and lists any changes from this RAWP;
19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of engineering and institutional controls and reporting at a specified frequency; and
20. Continued registration with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls and management of these controls in compliance with an approved SMP. Institutional controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

Track 4 Site-Specific Soil Cleanup Objectives (SCOs) proposed for this project are:

<b><u>Contaminant</u></b>	<b><u>SCO</u></b>
SVOCs	250 ppm
Arsenic	24 ppm
Barium	800 ppm
Lead	1000 ppm
Mercury	2.5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan Appendix 3. Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Estimated Soil/Fill Removal Quantities

Hotspot areas will be excavated under this remedial action including arsenic and mercury hotspots identified in the Remedial Investigation and end point remedial performance samples will be collected as discussed below. The total quantity of soil/fill expected to be excavated and disposed off-Site in the area of the proposed cellar (65'x74'x10') is approximately 1,782 cubic yards or 2,673 tons. Soil excavation below the water table is anticipated for the area surrounding the UST to be closed and removed in the southwest portion of the Site. The area of petroleum impacted soil may be excavated until no visual evidence of petroleum impacts are present and laboratory analysis confirms the required end point samples taken meet regulatory requirements. Based on the borings advanced during the RI, the area surrounding the on-site UST to be remediated is estimated at up to approximately (40' x 50') 2,000 square feet. The proposed building footprint and cellar will occupy the present area of the UST. Therefore, petroleum impacted material is estimated to be excavated from 10 feet below grade up to 30 feet below grade or until non-impacted material is observed. Therefore, a maximum of (40' x 50' x 20') approximately 1,482 cubic yards or 2,223 tons of petroleum impacted material may be removed at the Site. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-Point Sampling

Removal actions under this plan will be performed in conjunction with confirmation end-point sampling. Post-excavation end-point sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Track 4–Site Specific SCOs, samples will be collected and analyzed for trigger compounds and elements established on the Track 4 Site-Specific SCO list. The approximate collection location of the six endpoint soil samples is shown on Figure 6. The end-point sampling and testing will be performed promptly following excavation and be completed prior to any site development activities. In addition, hotspot removal actions will be performed in conjunction with remedial end point sampling at a frequency will consist of the following:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
  - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
  - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Per discussion with OER, after excavation activities are completed four (4) end point samples will be collected and analyzed for Track 4 acceptable levels of the following: Total SVOCs, Arsenic, Barium, Lead and Mercury. The first two samples will be collected at bottom excavation of the grass area and the next two samples will be collected from the bottom of the proposed building footprint. If the levels are not acceptable for Track 4 SCOs, the excavation will continue until an acceptable level is reached.

Post-remediation sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be analyzed for trigger analytes (those for which SCO exceedances are identified) utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/Herbicides/PCBs by EPA Method 8081/8321/8082.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

#### Quality Assurance/Quality Control

One (1) duplicate sample will be collected for each of 20 samples collected and at least one (1) field and one (1) lab blank samples or more will be collected to sufficiently assess sampling and lab artifacts.

#### Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of soil to be imported into the Site for backfill and cover soil is zero tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is zero tons.

#### Spill Closure

Spill remediation (Numbers 12069824 and 0212132) will be performed independent of this RAWP and under NYSDEC authority. The NYSDEC approved Spill Remedial Action Work Plan including groundwater treatment and monitoring will be performed under NYSDEC authority.

### 1.3 Personnel

The following is a list of the names and job functions of key site safety personnel assigned to this project:

Senior Project Manager	To be determined (Consultant)
Senior Project Engineer	To be determined (Consultant)
Site Inspector / Site Safety Officer (SSO)	To be determined (Consultant)
Project Engineer	To be determined (Consultant)
Equipment Operator	To be determined (Subcontractor)
Laborer	To be determined (Subcontractor)

The SSO will be responsible overall for field implementation of the HASP. The SSO and subcontractor personnel will be certified for the Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations (HAZWOPER) training, with a current 8 hour OSHA annual refresher. Additional training and/or certification will be necessary depending upon specific safety concerns not covered by the annual refresher (e.g. confined space).

The SSO will be authorized to administer the HASP. The SSO's primary operational responsibilities include personal and environmental monitoring, selection and monitoring of personal protective equipment, assignment of protection levels, coordination/review of work permits and observation of work activities. The SSO will be authorized to stop work in the event of an imminent health or safety risk exists. The SSO will review the essential safety requirements with all on-site personnel and will facilitate the daily safety meetings.

Specific responsibilities for SSO (and/or SS) would include among others:

- Coordinating protective measures including work practices and personal protective equipment;
- Conducting and preparing reports of daily safety inspections of work processes, site conditions, equipment conditions;
- Assisting the SS in incident investigations;
- Maintaining site safety records;
- Conducting inspections of all fire extinguishers, first-aid kits and eye washes/emergency showers on a regular basis; and,
- Informing subcontractors of the elements of the HASP.

## 2.0 SITE HAZARDS

### Contaminant/Waste Characteristics:

General Forms:  solid     liquid     sludge     Gas/vapor

### Contaminant/Waste Classes:

corrosive     radioactive     reactive     toxic  
 ignitable     volatile     unknown     construction/medical

**Possible contaminant/wastes present:**

Chemical	Exposure limits	Routes of entry	Symptoms of over-exposure
Benzene	NIOSH TWA 0.1 ppm ST 1 ppm OSHA TWA 1 ppm ST 5 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]
Ethylbenzene	NIOSH TWA 40 ppm OSHA TWA 100 ppm	Inhalation.	Irritating to the eyes, the skin and the respiratory tract, aspiration into the lungs with the risk of chemical pneumonitis, central nervous system. Exposure at high levels may result in unconsciousness.
Lead	NIOSH TWA 250 ppm OSHA TWA 1000 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Blood and bone marrow damage, central nervous system depression, kidney damage, anemia, nerve disease, abdominal cramps and reproductive damage.
Mercury	NIOSH TWA 0.05 ppm OSHA TWA 0.05 ppm	Inhalation of vapor and through skin as vapor.	Central nervous system and kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Possibly causes toxic effects upon human reproduction.
Arsenic	NIOSH TWA 0.01 ppm OSHA TWA 0.01 ppm	Inhalation of its vapor and ingestion.	Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant). Carcinogenic for humans. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.
Naphthalene	NIOSH TWA 15 ppm OSHA TWA 10 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	The substance may cause effects on the blood, resulting in lesions of blood cells (haemolysis). See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.

Chemical	Exposure limits	Routes of entry	Symptoms of over-exposure
Tetrachloroethene	NIOSH 75 ppm OSHA 75 ppm IDLH 1000 ppm	Inhalation, Ingestion	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, central nervous system depression; [potential occupational carcinogen]
Toluene	NIOSH TWA 100 ppm OSHA TWA 200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, central nervous system damage and erratic heart beat
Xylene	NIOSH TWA 100 ppm ST 150 ppm OSHA TWA 100 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system, possible reproductive damage
Vinyl Chloride	NIOSH REL: CA 1 ppm OSHA TWA	Inhalation, skin and or eye contact of liquid	Weak abdominal pain, enlarged liver, pallor or cyan of extremities, liquid frostbite, gastrointestinal bleeding

**Notes:**

TLV= Threshold limit value

TWA= Time weighted average

**Safety hazards:**

- |   |  |
|---|--|
| <input type="checkbox"/> Poison ivy/oak   | <input type="checkbox"/> Stacked drums                             |
| <input checked="" type="checkbox"/> Wet or slippery surfaces                                    | <input type="checkbox"/> Ticks                                     |
| <input checked="" type="checkbox"/> Darkness  | <input type="checkbox"/> Infectious waste                          |
| <input checked="" type="checkbox"/> Surface debris (broken glass, sharp objects)                | <input checked="" type="checkbox"/> Excavations                    |
| <input checked="" type="checkbox"/> Excessive noise   | <input checked="" type="checkbox"/> Above or underground utilities |
| <input checked="" type="checkbox"/> hoses, tools, etc. on ground (slip, trip, fall)             | <input type="checkbox"/> Unstable building structures              |
| <input type="checkbox"/> Confined spaces (Confined Space Entry Program Required if applicable). |  |

MSDS Sheets for contaminants that may be encountered on site are included as Appendix A.

### 3.0 SITE OPERATIONS

**Tasks to be performed:**

- Soil boring installation
- Sample collection of soil
- Temporary well point (TWP) installation
- Sample collection of groundwater
- Sample collection of Soil Gas

**Work Zone Map**

**Figures 1 and 2** indicate the perimeter of the Site which is also the work zone. Note that the exclusion zones will be in the immediate vicinity (minimum 25 feet radius) of the active work area and will be maintained only when the possibility of a hazardous situation exists. The support zone and personnel decontamination area will also move with the work zone.

**Locations of Safety Equipment:**

Safety Item	Safety Note	Location
Eye wash	Required for all intrusive activities	Personal eye wash in each first aid kit
First Aid Kit	Required for all activities	Support Zone

#### 4.0 PERSONAL PROTECTION

Level of Protection (L.O.P.) to be employed for each site task.

TASK	INITIAL L.O.P.	UPGRADE L.O.P.
Soil excavation and staging	D	Modified D/ C
Excavated materials handling, and T&D	D	Modified D/ C
Unloading and loading activities	D	Modified D/ C
USTs removal, if encountered	D	Modified D/ C
Engineering controls application	D	Modified D/ C

Level D:

- steel toe/steel shank safety shoes
- rubber overboots or disposable boot covers (Modified Level D \*)
- Polyethylene coated Tyvek coveralls (Modified Level D \*)
- Nitrile Outer gloves (Modified Level D \*)
- Latex Inner gloves
- Face Shield (Modified Level D \*)
- hard hat \*      Yes       No
- safety glasses \*      Yes       No

Level C:

- steel toe/shank safety shoes
- rubber overboots or disposable boot covers
- full-face respirator with GMCH cartridges
- Polyethylene coated Tyvek coveralls
- Nitrile outer gloves
- Latex inner gloves
- hard hat \*      Yes       No

Level B\*: (Level B upgrade not planned for this site; if conditions exist that warrant this level of PPE, then work will be terminated until appropriate further actions to remediate conditions are determined)

- steel toe/shank safety shoes
- Rubber overboots or disposable boot covers
- Pressure-demand SCBA
- Saranex (or equal) coveralls
- Nitrile outer gloves
- Latex inner gloves

Hard hat    Yes       No

Other safety equipment:

- hearing protection \*
- tick spray
- Reflective Vests

- cooler(s)
- sunscreen
- Safety Cones
- Gatorade and cups (hot work only)

\* **Hearing protection, hard hat and safety glasses required while working near drilling equipment. Additional Modified Level D items such as: rubber overboots, PVC coated Tyvek coveralls, Nitrile Outer gloves and Face Shields will be required when investigating unknown waste materials if encountered.**

**5.0 AIR MONITORING**

**5.1 Monitoring Instruments**

<b>Instrument (make/model)</b>	<b>Purpose and Frequency</b>	<b>Response Ranges</b>	<b>Field Check Gas</b>
HNU Systems Model PI-101 Photoionization Detector (PID) (or equivalent)	Breathing zone monitoring for total ionizable volatile organic compounds. Continuous Monitoring.	0 to 20 units 0 to 200 units 0 to 2,000 units by operator selection	The instrument is field checked with 100 ppm Isobutylene to read 55 ppm (benzene equivalent) at a 9.8 span setting.
<b>Instrument (make/model)</b>	<b>Purpose and Frequency</b>	<b>Response Ranges</b>	<b>Field Check Gas</b>

**NOTE:**  
 Continuous monitoring shall be performed for level C protection.  
 Soils shall be screened with the PID for contamination during investigative activities.

**5.2 Air Quality Action Levels**

**A. L.O.P. Action Levels:**

<b>Contaminant</b>	<b>Range</b>	<b>L.O.P.</b>
Organic Vapors	Background to 5 ppm above background*	Level D
	5 ppm to 10 ppm above background*	Level C
	Greater than 10 ppm above background*	Level B

\* Concentrations above background sustained for one minute or longer

## **6.0 DECONTAMINATION**

All personnel and portable equipment used on site shall be thoroughly decontaminated before leaving the site.

### ***6.1 Decontamination of Personnel***

Non-disposable clothing such as boots, goggles and hard hats shall be washed, as appropriate, using an Liqui-Nox and water solution and scrub brushes.

#### **Decontamination Procedure:**

1. Wash and rinse boots and gloves in an Liqui-Nox and water solution
2. Rinse again paying special attention to the soles of the boots
3. Remove tapes
4. Remove boots
5. Remove outer gloves
6. Remove coveralls
7. Remove outer surgical gloves (if present)
8. Remove respirator
9. Remove inner surgical gloves
10. Wash hands, arms and face

### ***6.2 Decontamination of Equipment and Instruments***

#### **Small Equipment and Instruments:**

All reusable equipment shall be scrubbed with Liqui-Nox and water prior to removal from the site. If this method is not sufficient to decontaminate, steam cleaning will used, if applicable. When feasible, electronic instruments should be wrapped in plastic for protection to avoid washing instruments with water. Remember to allow intake ports, vents, etc. of the instruments for proper operation of the instrument.

#### **Heavy Equipment:**

Heavy equipment should be decontaminated prior to leaving the site. This should include manual removal of gross contamination with shovels or other tools. A steam cleaning station will be set up for decontamination of heavy equipment at the site or an area designated by the Field Operations Manager if necessary. Because decontamination at the steam cleaning station poses the possibility of a splash, the task should be performed using modified Level D personal protective equipment. Face shields are recommended during steam-cleaning operations if conducted.

### ***6.3 Disposal of Contaminated Material***

It is anticipated that during the course of the site investigation, a limited quantity of investigative derived waste (IDW) may be generated, including personal protective equipment (PPE). Based on the types of sampling to be performed under this sampling plan, the quantity of waste material is not expected to be substantial and is expected to include PPE, drill cuttings, purge water from well development and sampling, and spent decontamination solutions. All PPE and disposable equipment will be removed from the site at the conclusion of the investigations. All IDW will be field screened with a photoionization

detector (PID) for VOCs and be disposed appropriately either on-site or containerized for characterization and subsequent off-site disposal, if deemed necessary. Containerization of drill cuttings will be provided contingent on field screening observations.

**6.4 Decontamination Equipment and Supply Checklist**

- Wash tubs/buckets
- Water sprayers
- Scrub brushes
- Liqui-Nox
- Deionized water
- Plastic garbage bags
- Disposable wipes
- Poly sheeting
- 55-gallon drums (if needed)

## 7.0 EMERGENCY RESPONSE

### 7.1 *Communication*

Team members will always work in groups of two or more while on site. Visual contact distance among team members must be maintained at all times. Hand signals will be used on-site to ensure safety during high noise instances. Should an emergency occur, other team members will be alerted via hand signals, air horns, whistles or other devices.

CONTINUOUS HORN/WHISTLE BLAST: is the emergency signal to indicate the onset of an emergency requiring that personnel vacate the Exclusion Zone immediately and meet at the designated area discussed in Section 7.2 below.

### 7.2 *Evacuation*

In the event of an emergency, such as fire, explosion, toxic gas release etc, personnel will leave the site and congregate at the corner of Graham Avenue and Driggs Avenue.

### 7.3 *Personnel Injury or Exposure*

In the event of an injury within the Exclusion Zone, all equipment within the zone, if not needed for response to the emergency, will be shut down. On-site personnel trained in First Aid and CPR will initiate first response treatment of the injured person(s). An eyewash station and water sprayer shall be available in the CRZ or support zone. All other personnel will assemble at the decontamination line. The on-site Safety Officer and the Field Operations Manager will evaluate the nature and extent of the injury. The victim will be decontaminated to the extent possible before moving to the Support Zone.

If necessary, emergency personnel will be contacted for medical aid and emergency transportation to the **Woodhull Medical Center**. No persons will re-enter the Exclusion Zone until the cause of the injury or symptoms have been determined.

#### **First aid for Personnel exposure:**

Skin contact: Flush with water

Inhalation: Move person to fresh air; provide respiration and transport to **Woodhull Medical Center** if signs of injury or exposure persist.

Ingestion: Decon and transport to **Woodhull Medical Center**.

### 7.4 *Emergency Decontamination Procedures*

If decon can be performed without aggravating injuries or delaying life-saving treatment, protective clothing will be washed, and rinsed or cut off from the injured personnel. If decontamination cannot be done, for instance due to signs of acute exposure being exhibited, the victim will be wrapped in blankets, plastic or rubber to reduce contamination of other on-site personnel and rescue workers, and transported to **Woodhull Medical Center**. Emergency and off-site medical personnel will be alerted to the risk of potential exposure to contamination while handling the injured.

### 7.5 *Emergency Information*

Emergency Service:	Phone Number:
Ambulance	911
Emergency Room ( <b>Woodhull Medical Center</b> )	911 or <b>(718) 963-8000</b>
Police	911
Fire Department	911

If a field employee becomes injured or ill while on the job, transport to **Woodhull Medical Center**. Also, contact management. State that the injury or illness is an "on the job injury" and provide Material Safety Data Sheet for compounds involved.

Poison Control Center	(800) 962-1253
Office of Site Safety and Health	(609) 984-9779
USEPA Emergency Response	(800) 424-8802

GRANT engineering (main number)	(212) 464-8689
Program Director (TBD)	( )
Project Manager (TBD)	( )
RI Task Leader (TBD)	( ) ____ - ____

### 7.6 *General Emergency Procedures*

In the event of an emergency, the following initial procedures shall be implemented to ensure that the appropriate parties are notified and the scene of the emergency is secured:

- 1) Notify the appropriate local authorities (Police, Fire, Ambulance, etc.)
- 2) Notify the appropriate officials (Case Manager, HazMat Team, etc.)
- 3) Cordon off the emergency scene to the extent possible using caution tape, cones, drums, etc. Berger personnel will also prevent pedestrians from entering the emergency scene until local authorities arrive on-site.

**7.7 Update of Emergency Response Plan**

The Emergency Response Plan shall be periodically reviewed and amended as necessary to keep it current with new or changing site conditions or information. Additionally, if an emergency occurs on-site, the incident will be reviewed to determine if the response measures employed were effective and make modifications as necessary.

**Route to the Hospital:** A map indicating the fastest route from the Site to **Woodhull Medical Center** is included as **Figure 12**. Personnel will also be provided with written instructions for accessing the hospital from the site.

<b>Driving directions to Woodhull Medical Center</b>		
	<b>498 Leonard St</b> <b>Brooklyn, NY 11222</b>	
	<b>1. Head south on Leonard St toward Engert Ave</b>	
		<b>0.3 mi</b>
	<b>2. Turn right onto Meeker Ave</b>	
		<b>0.2 mi</b>
	<b>3. Turn left onto Union Ave</b>	
		<b>0.7 mi</b>
	<b>4. Turn left onto Broadway</b> Destination will be on the right	
		<b>0.6 mi</b>
	<b>Woodhull Medical Center</b> <b>760 Broadway</b> <b>Brooklyn, NY 11206</b>	

## **8.0 GENERAL REQUIREMENTS**

### **8.1 Training**

All activities outlined in Section 3.0 are anticipated to be conducted under the initial Level of Protection (L.O.P.) of Level D, and will not require OSHA HAZWOPER trained workers, except for HAZWOPER trained Site Safety Officer (SSO) or Site Supervisor (SS). In the event that any exposure limits outlined in Section 2.0 are exceeded, work activities will be temporarily suspended until readings have returned below exposure limits. In the event that an upgrade of L.O.P. is deemed necessary, only OSHA HAZWOPER trained personnel will be allowed to continue the work activities within exclusion zones.

SS, SSO, and any personnel engaged in exclusion zone activities must have completed a minimum of 40 hours of environmental safety and health OSHA (HAZWOPER) training with a current 8 hour OSHA annual refresher. On-site managers and supervisors directly responsible for and/or who supervise personnel engaging in field activities shall have completed additional training in the supervision of those activities. A site safety meeting shall be conducted prior to the start of on-site activities, and/or before each day's work as deemed necessary. Those not having completed the 40-hour training requirement are not to enter the exclusion zone.

### **8.2 Medical Surveillance**

All personnel who are potentially exposed to hazardous substances must be enrolled in the medical surveillance program (MSP) and must have had an up-to-date physical. Those not enrolled in the MSP are not to enter the exclusion zone.

### **8.3 General Safety Rules**

The following is a list of general safety rules in effect at the site.

- a. There will be no eating, drinking, or smoking in the exclusion or contamination reduction zone.
- b. All personnel must pass through the contamination reduction zone to enter or exit the exclusion zone.
- c. At a minimum, an emergency deluge shower/spray is to be located on the clean side of the contamination reduction area (for Level C and above).
- d. All personnel shall wash hands, arms and face before eating, smoking or drinking and at the end of the workday.
- e. All supplied breathing air shall be certified as grade D or better.
- f. Where practical and necessary, all tools/equipment will be sparking proof, explosion resistant, and/or bonded and grounded.
- g. Fire extinguishers will be on-site for use on equipment or small fires only.
- h. An adequate supply of cool drinking water (at least 1 gallon per person) with an ample supply of disposable cups shall be present during each day of site operations, and be readily available to site personnel.

#### **8.4 Other Safety Precautions and Hazardous Operations**

##### **Utility Clearance**

If excavation will take place in area of utilities, all utilities will be cleared prior to site excavation activity.

##### **Confined Space Operations**

No confined space operations are anticipated for the tasks covered under this remedial investigation.

Confined Spaces are identified at: **None**

Confined Space Entry Permits are required: Yes  No  NA

##### **Site Security**

All personnel shall be briefed (at safety meeting and site visit) prior to entering and working at the Site; all work areas and limited entry areas will be barricaded and marked at their perimeter and entry points during active field work.

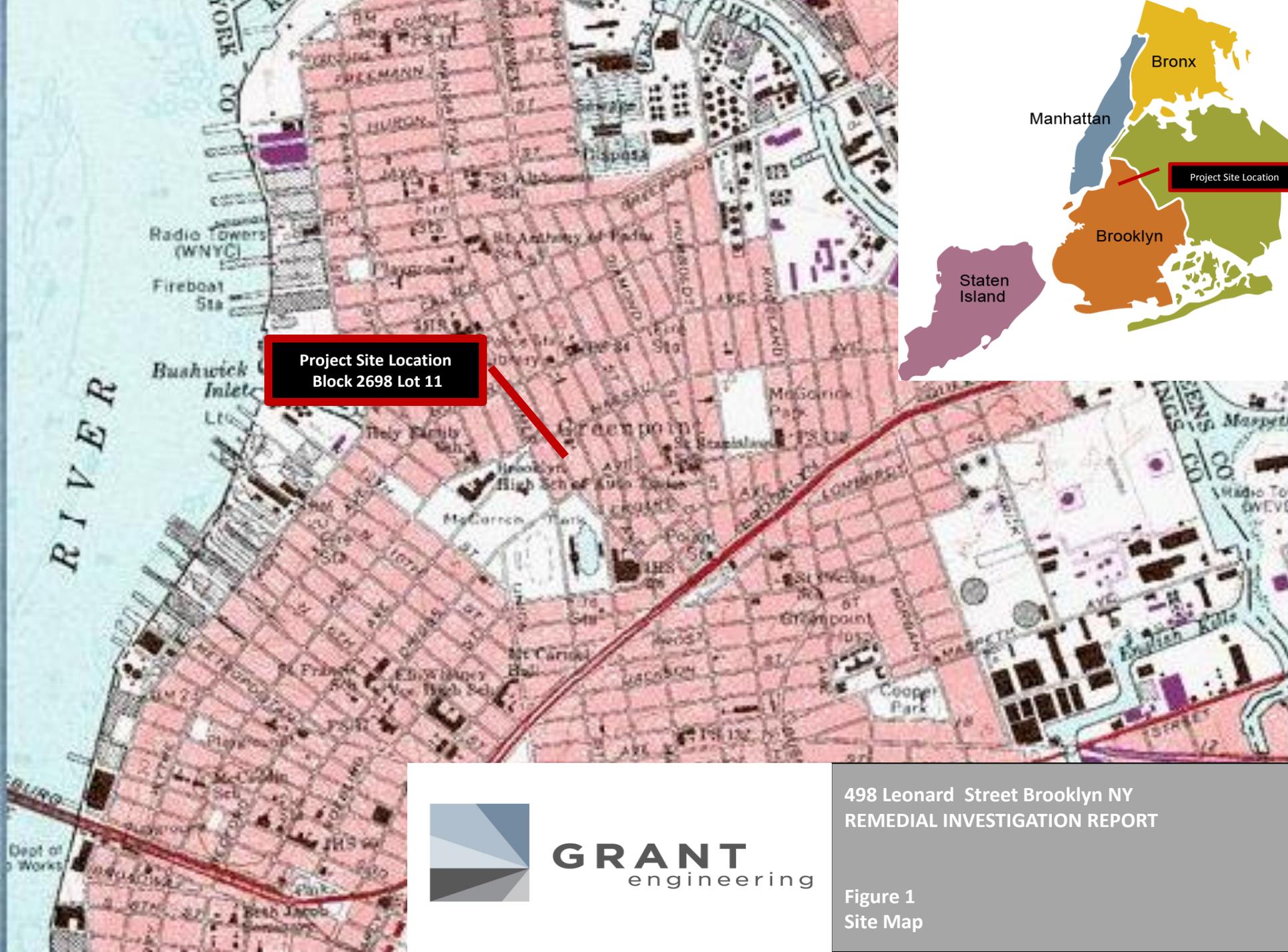
A Site map indicating all planned work areas is presented as Figure 2 in this report and will be made available to all site personnel.

##### **Hot Work**

Permit-required hot work is not anticipated for this project. However, if such work becomes necessary, the on-site Safety Officer will issue hot work permits.

## FIGURES

1. Site Map
2. Site Location Plan
3. Location of Soil Borings, Wells and Soil Vapor Samples
4. VOC Contamination in Soil
5. SVOC Contamination in Soil
6. Metal Contamination in Soil
7. Pesticide Contamination in Soil
8. VOC, SVOC, and Pesticide Contamination in Groundwater
9. Metal Contamination in Groundwater
10. VOC Contamination in Soil Vapor
11. Legend for Figure 4 through 10
12. Route to Hospital Map



**Project Site Location  
Block 2698 Lot 11**

**Project Site Location**

498 Leonard Street Brooklyn NY  
REMEDIAL INVESTIGATION REPORT



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Figure 1  
Site Map



Leonard Street

498 Leonard St.

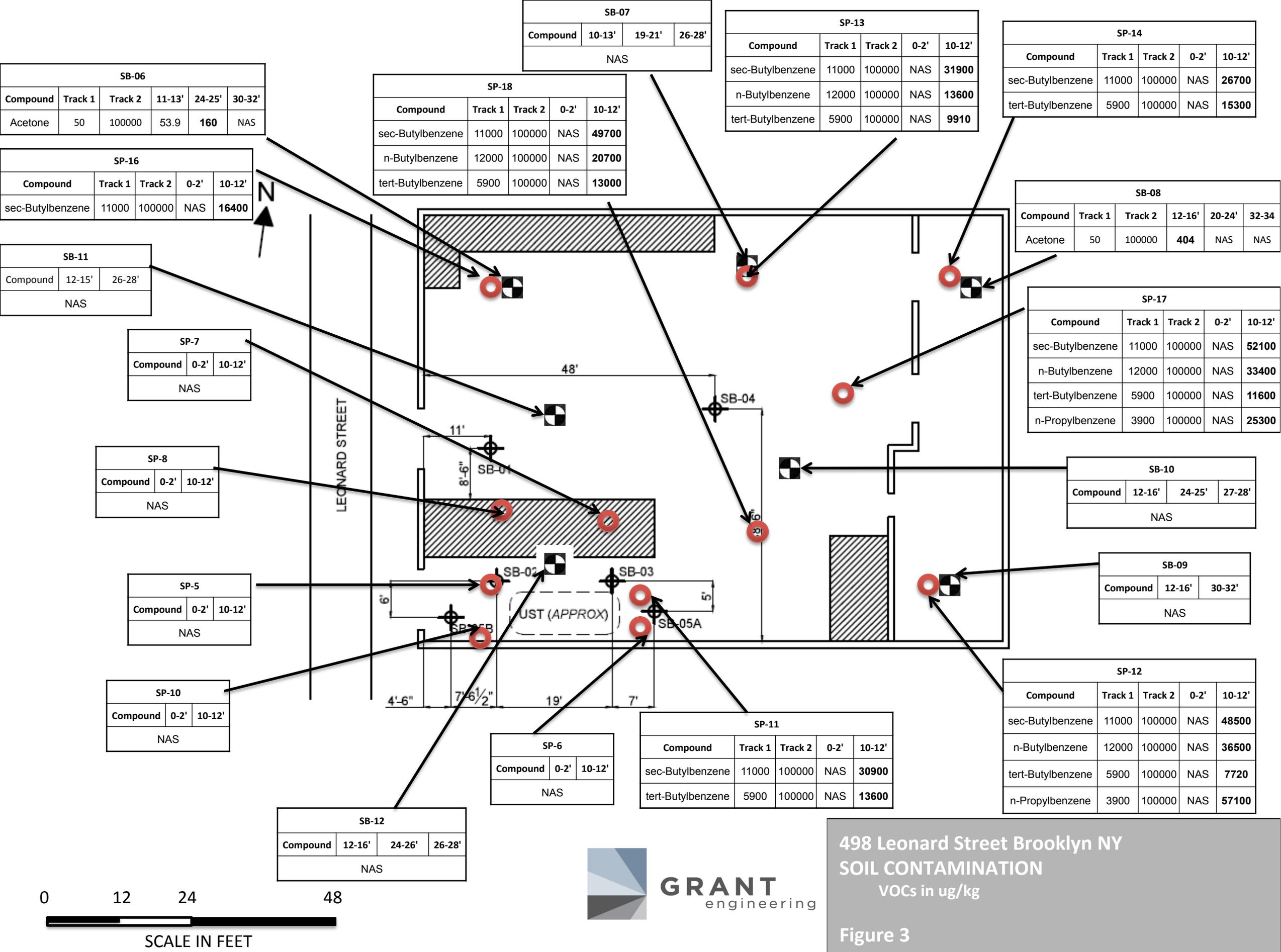


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498 Leonard Street Brooklyn NY  
REMEDIAL INVESTIGATION REPORT

Figure 2  
Site Location Plan





SB-07			
Compound	10-13'	19-21'	26-28'
NAS			

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	31900
n-Butylbenzene	12000	100000	NAS	13600
tert-Butylbenzene	5900	100000	NAS	9910

SP-14				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	26700
tert-Butylbenzene	5900	100000	NAS	15300

SB-06					
Compound	Track 1	Track 2	11-13'	24-25'	30-32'
Acetone	50	100000	53.9	160	NAS

SP-18				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	49700
n-Butylbenzene	12000	100000	NAS	20700
tert-Butylbenzene	5900	100000	NAS	13000

SP-16				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	16400

SB-11		
Compound	12-15'	26-28'
NAS		

SB-08					
Compound	Track 1	Track 2	12-16'	20-24'	32-34'
Acetone	50	100000	404	NAS	NAS

SP-7		
Compound	0-2'	10-12'
NAS		

SP-17				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	52100
n-Butylbenzene	12000	100000	NAS	33400
tert-Butylbenzene	5900	100000	NAS	11600
n-Propylbenzene	3900	100000	NAS	25300

SP-8		
Compound	0-2'	10-12'
NAS		

SB-10			
Compound	12-16'	24-25'	27-28'
NAS			

SP-5		
Compound	0-2'	10-12'
NAS		

SB-09		
Compound	12-16'	30-32'
NAS		

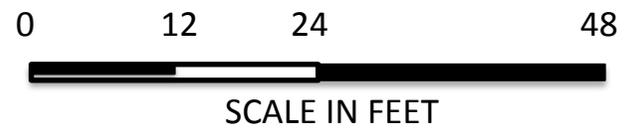
SP-10		
Compound	0-2'	10-12'
NAS		

SP-12				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	48500
n-Butylbenzene	12000	100000	NAS	36500
tert-Butylbenzene	5900	100000	NAS	7720
n-Propylbenzene	3900	100000	NAS	57100

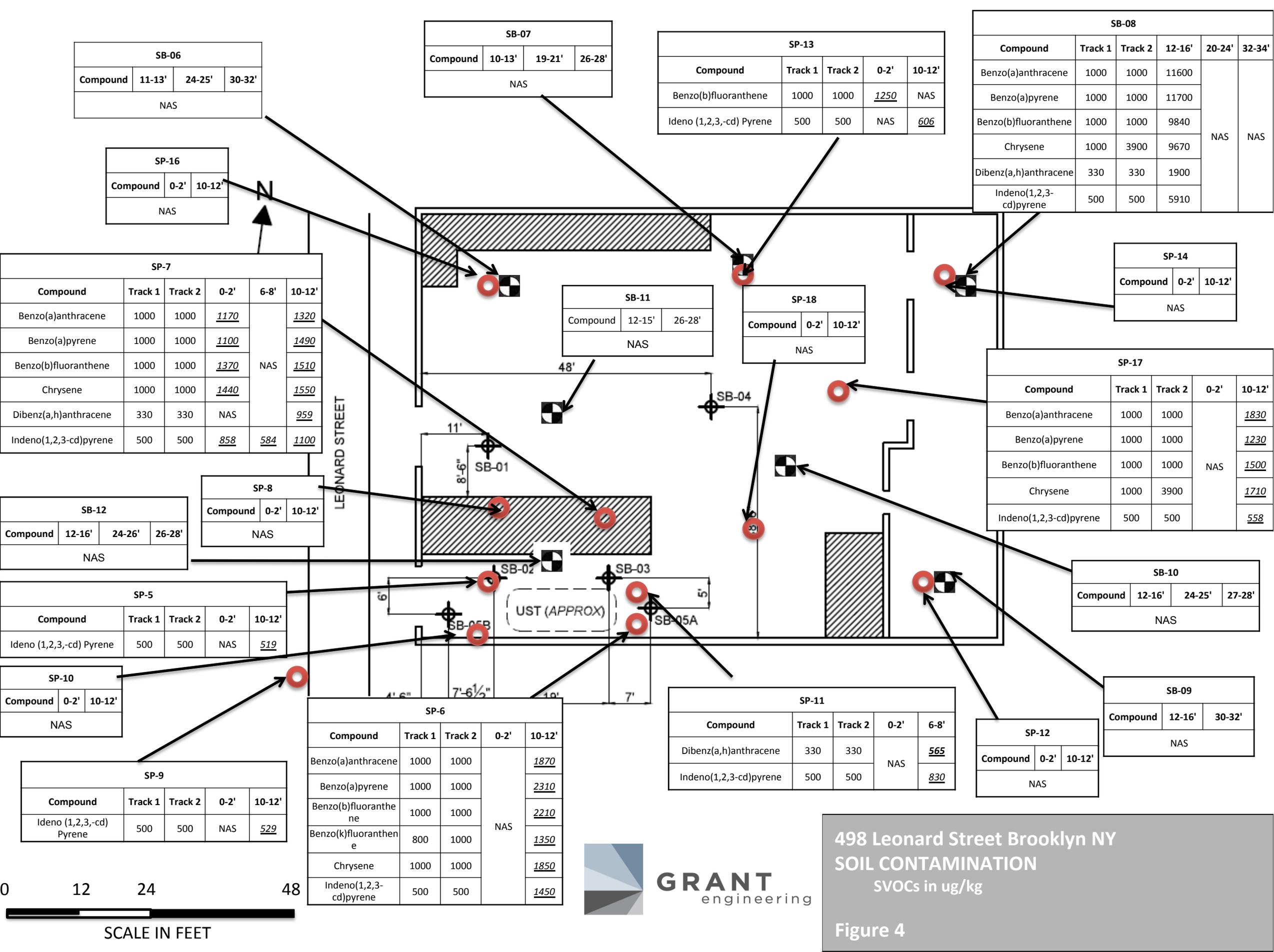
SP-6		
Compound	0-2'	10-12'
NAS		

SP-11				
Compound	Track 1	Track 2	0-2'	10-12'
sec-Butylbenzene	11000	100000	NAS	30900
tert-Butylbenzene	5900	100000	NAS	13600

SB-12			
Compound	12-16'	24-26'	26-28'
NAS			



498 Leonard Street Brooklyn NY  
SOIL CONTAMINATION  
VOCs in ug/kg  
Figure 3



SB-06			
Compound	11-13'	24-25'	30-32'
NAS			

SB-07			
Compound	10-13'	19-21'	26-28'
NAS			

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
Benzo(b)fluoranthene	1000	1000	<u>1250</u>	NAS
Ideno (1,2,3,-cd) Pyrene	500	500	NAS	<u>606</u>

SB-08					
Compound	Track 1	Track 2	12-16'	20-24'	32-34'
Benzo(a)anthracene	1000	1000	11600	NAS	NAS
Benzo(a)pyrene	1000	1000	11700		
Benzo(b)fluoranthene	1000	1000	9840		
Chrysene	1000	3900	9670		
Dibenz(a,h)anthracene	330	330	1900		
Indeno(1,2,3-cd)pyrene	500	500	5910		

SP-16		
Compound	0-2'	10-12'
NAS		

SP-7					
Compound	Track 1	Track 2	0-2'	6-8'	10-12'
Benzo(a)anthracene	1000	1000	<u>1170</u>	NAS	<u>1320</u>
Benzo(a)pyrene	1000	1000	<u>1100</u>		<u>1490</u>
Benzo(b)fluoranthene	1000	1000	<u>1370</u>		<u>1510</u>
Chrysene	1000	1000	<u>1440</u>		<u>1550</u>
Dibenz(a,h)anthracene	330	330	NAS		<u>959</u>
Indeno(1,2,3-cd)pyrene	500	500	<u>858</u>		<u>584</u>

SP-14		
Compound	0-2'	10-12'
NAS		

SB-11		
Compound	12-15'	26-28'
NAS		

SP-18		
Compound	0-2'	10-12'
NAS		

SP-17					
Compound	Track 1	Track 2	0-2'	10-12'	
Benzo(a)anthracene	1000	1000	NAS	1830	1230
Benzo(a)pyrene	1000	1000			
Benzo(b)fluoranthene	1000	1000			
Chrysene	1000	3900			
Indeno(1,2,3-cd)pyrene	500	500			

SB-12			
Compound	12-16'	24-26'	26-28'
NAS			

SP-8		
Compound	0-2'	10-12'
NAS		

SP-5				
Compound	Track 1	Track 2	0-2'	10-12'
Ideno (1,2,3,-cd) Pyrene	500	500	NAS	<u>519</u>

SP-10		
Compound	0-2'	10-12'
NAS		

SP-9				
Compound	Track 1	Track 2	0-2'	10-12'
Ideno (1,2,3,-cd) Pyrene	500	500	NAS	<u>529</u>

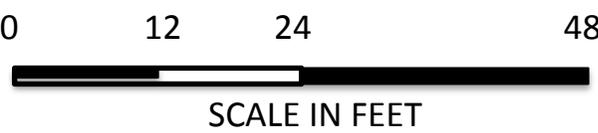
SP-6				
Compound	Track 1	Track 2	0-2'	10-12'
Benzo(a)anthracene	1000	1000	NAS	<u>1870</u>
Benzo(a)pyrene	1000	1000		<u>2310</u>
Benzo(b)fluoranthene	1000	1000		<u>2210</u>
Benzo(k)fluoranthene	800	1000		<u>1350</u>
Chrysene	1000	1000		<u>1850</u>
Indeno(1,2,3-cd)pyrene	500	500		<u>1450</u>

SP-11				
Compound	Track 1	Track 2	0-2'	6-8'
Dibenz(a,h)anthracene	330	330	NAS	<u>565</u>
Indeno(1,2,3-cd)pyrene	500	500		<u>830</u>

SB-10			
Compound	12-16'	24-25'	27-28'
NAS			

SB-09		
Compound	12-16'	30-32'
NAS		

SP-12		
Compound	0-2'	10-12'
NAS		



498 Leonard Street Brooklyn NY  
 SOIL CONTAMINATION  
 SVOCs in ug/kg  
 Figure 4

SB-11				
Compound	Track 1	Track 2	12-15'	26-28'
Lead	63	400	<u>259</u>	NAS
Mercury	0.18	0.81	<u>2.49</u>	NAS
Zinc	109	10000	<u>124</u>	NAS

SP-16				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	<u>15.1</u>	<u>16.3</u>
Cadmium	2.5	2.5	<u>2.8</u>	<u>3.11</u>
Copper	50	270	<u>211</u>	<u>88.9</u>
Lead	63	400	<u>806</u>	<u>527</u>
Zinc	109	2200	<u>1040</u>	<u>346</u>

SB-06					
Compound	Track 1	Track 2	11-13'	24-25'	30-32'
Copper	50	270	<u>225</u>	NAS	NAS
Lead	63	400	<u>414</u>	NAS	
Mercury	0.18	0.81	<u>3.77</u>	<u>0.3</u>	
Zinc	109	10000	<u>951</u>	NAS	

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	NAS	40.6
Barium	350	350	NAS	879
Copper	50	270	156	407
Lead	63	400	590	2660
Mercury	0.18	0.81	NAS	NAS
Zinc	109	2200	385	2080

SP-14				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	<u>18.2</u>	<u>34.8</u>
Cadmium	2.5	2.5	<u>3.88</u>	<u>3.75</u>
Copper	50	270	<u>127</u>	<u>120</u>
Lead	63	400	<u>1150</u>	<u>3000</u>
Mercury	0.18	0.81	NAS	<u>0.207</u>
Zinc	109	2200	<u>1400</u>	<u>664</u>

SP-7				
Compound	Track 1	Track 2	0-2'	10-12'
Chromium Trivalent	30	36	<u>43.9</u>	<u>82.4</u>
Arsenic	13	16	<u>59</u>	<u>16.1</u>
Barium	350	350	<u>777</u>	<u>818</u>
Cadmium	2.5	2.5	<u>3.46</u>	NAS
Chromium Hexavalent	1	22	<u>43.9</u>	NAS
Copper	50	270	<u>148</u>	<u>113</u>
Lead	63	400	<u>2020</u>	<u>1650</u>
Manganese	1600	2000	<u>1970</u>	NAS
Mercury	0.18	0.81	<u>25.3</u>	<u>2.67</u>
Zinc	109	2200	<u>500</u>	<u>379</u>

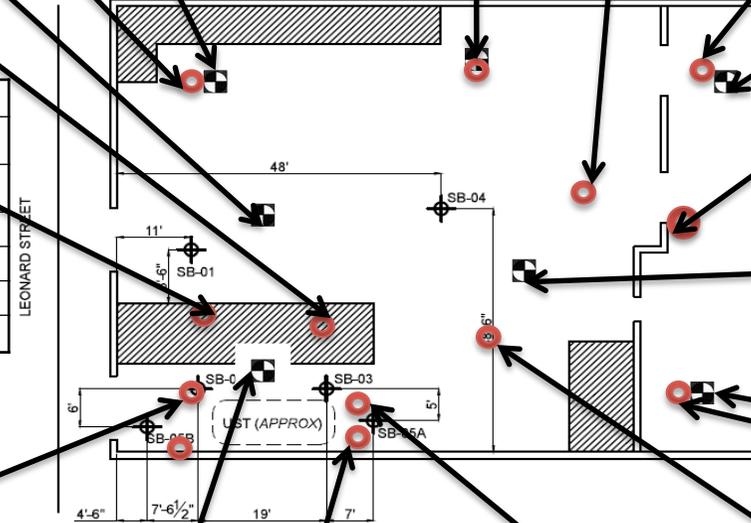
SB-07					
Compound	Track 1	Track 2	10-13'	19-21'	26-28'
Arsenic	13	16	<u>17.6</u>	NAS	NAS
Copper	50	270	<u>87.7</u>		
Lead	63	400	<u>1440</u>		
Zinc	109	10000	<u>174</u>		

SB-08					
Compound	Track 1	Track 2	12-16'	20-24'	32-34'
Lead	63	400	<u>332</u>	NAS	NAS
Zinc	109	10000	<u>135</u>		

SP-17				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	<u>2.98</u>	NAS
Copper	50	270	<u>59.9</u>	
Lead	63	400	<u>188</u>	
Mercury	0.18	0.81	0.52	
Zinc	109	2200	<u>132</u>	

SP-8				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	2.79	NAS
Copper	50	270	NAS	<u>283</u>
Lead	63	400	<u>135</u>	<u>5730</u>
Mercury	0.18	0.81	<u>1.05</u>	<u>0.6657</u>
Zinc	109	2200	<u>290</u>	<u>619</u>

SP-9				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	NAS	<u>2.85</u>
Lead	63	400	<u>400</u>	<u>373</u>
Mercury	0.18	0.81	<u>1.04</u>	<u>1.35</u>
Zinc	109	2200	<u>113</u>	NAS



SB-10					
Compound	Track 1	Track 2	12-16'	24-25'	27-28'
Arsenic	13	16	<u>74.5</u>	NAS	NAS
Copper	50	270	<u>160</u>	NAS	NAS
Lead	63	400	<u>605</u>	NAS	NAS
Mercury	0.18	0.81	<u>6.16</u>	<u>31.5</u>	<u>0.19</u>
Zinc	109	10000	<u>211</u>	NAS	NAS

SB-09				
Compound	Track 1	Track 2	12-16'	30-32'
Lead	63	400	<u>126</u>	NAS

SP-5				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	NAS	<u>41.5</u>
Barium	350	350	NAS	<u>450</u>
Cadmium	2.5	2.5	2.82	<u>2.8</u>
Copper	50	270	NAS	<u>51.4</u>
Lead	63	400	NAS	<u>283</u>
Mercury	0.18	0.81	NAS	<u>5.12</u>
Zinc	109	2200	296	<u>166</u>

SB-12					
Compound	Track 1	Track 2	12-16'	24-26'	26-28'
Arsenic	13	16	<u>23.5</u>	NAS	NAS
Copper	50	270	<u>66.4</u>	NAS	
Lead	63	400	<u>625</u>	NAS	
Mercury	0.18	0.81	<u>2.09</u>	0.18	
Zinc	109	10000	<u>154</u>	NAS	

SP-11					
Compound	Track 1	Track 2	0-2'	6-8'	10-12'
Arsenic	13	16	<u>14.5</u>	NAS	NAS
Cadmium	2.5	2.5	<u>4.02</u>	NAS	<u>2.88</u>
Copper	50	270	<u>77.5</u>	NAS	<u>73.6</u>
Lead	63	400	<u>523</u>	<u>247</u>	<u>467</u>
Mercury	0.18	0.81	<u>0.189</u>	NAS	NAS
Zinc	109	2200	<u>642</u>	<u>269</u>	<u>141</u>

SP-18				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	<u>5</u>	NAS
Copper	50	270	<u>177</u>	NAS
Lead	63	400	<u>919</u>	<u>83.5</u>
Mercury	0.18	0.81	<u>0.524</u>	<u>0.317</u>
Zinc	109	2200	<u>1340</u>	NAS

SP-12				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	<u>6.85</u>	NAS
Copper	50	270	<u>82.5</u>	NAS
Lead	63	400	<u>626</u>	<u>136</u>
Mercury	0.18	0.81	<u>0.368</u>	NAS
Zinc	109	2200	<u>384</u>	NAS

SP-6				
Compound	Track 1	Track 2	0-2'	10-12'
Barium	350	350	NAS	NAS
Lead	63	400	<u>320</u>	NAS
Mercury	0.18	0.81	<u>0.435</u>	<u>2.10</u>
Zinc	109	2200	<u>538</u>	NAS

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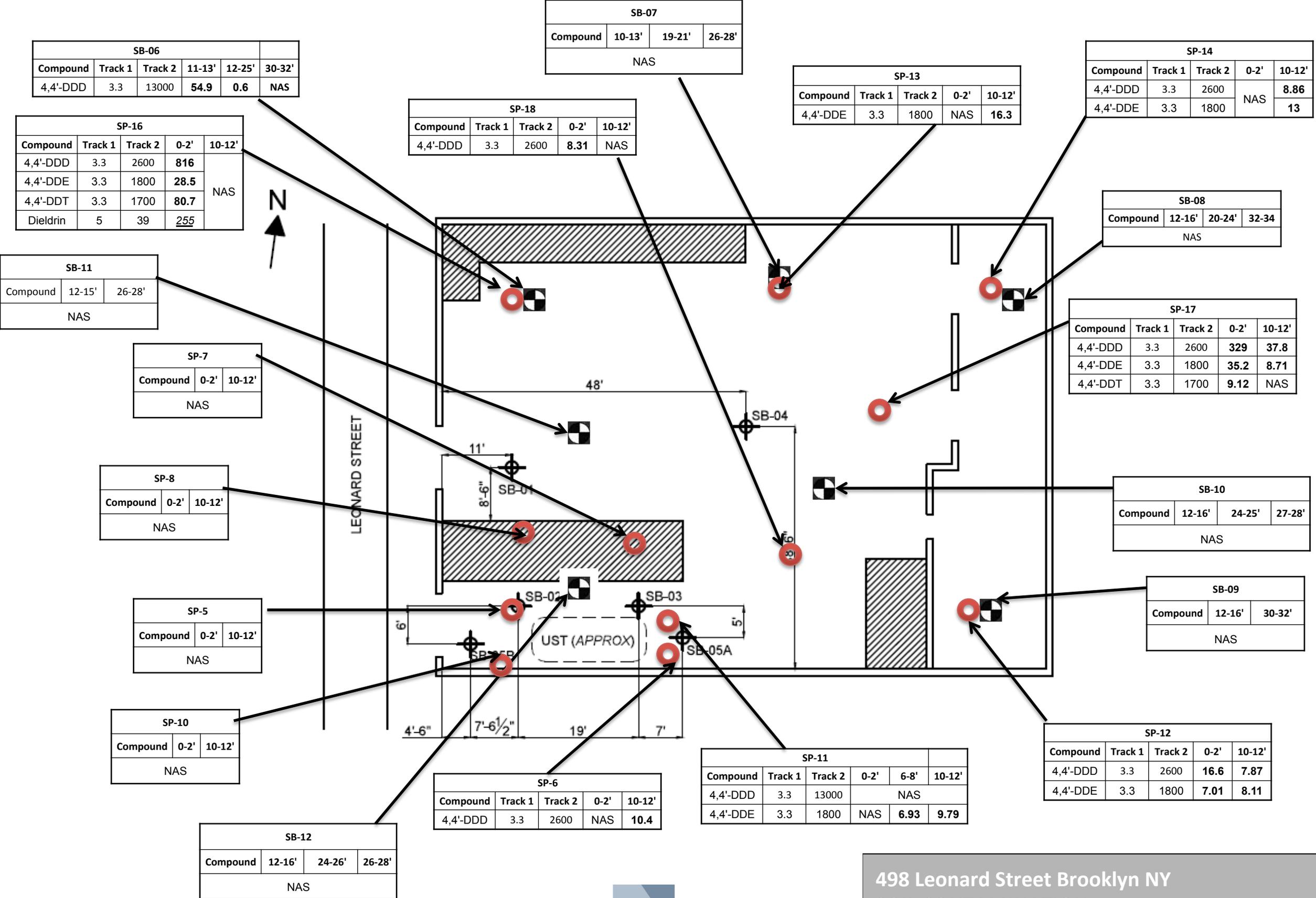
SCALE IN FEET



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498 Leonard Street Brooklyn NY  
SOIL CONTAMINATION  
Metals in mg/kg

Figure 5



SB-06					
Compound	Track 1	Track 2	11-13'	12-25'	30-32'
4,4'-DDD	3.3	13000	54.9	0.6	NAS

SB-07			
Compound	10-13'	19-21'	26-28'
NAS			

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDE	3.3	1800	NAS	16.3

SP-14				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	NAS	8.86
4,4'-DDE	3.3	1800		13

SP-16				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	816	NAS
4,4'-DDE	3.3	1800	28.5	
4,4'-DDT	3.3	1700	80.7	
Dieldrin	5	39	255	

SP-18				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	8.31	NAS

SB-08			
Compound	12-16'	20-24'	32-34'
NAS			

SB-11		
Compound	12-15'	26-28'
NAS		

SP-7		
Compound	0-2'	10-12'
NAS		

SP-17				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	329	37.8
4,4'-DDE	3.3	1800	35.2	8.71
4,4'-DDT	3.3	1700	9.12	NAS

SP-8		
Compound	0-2'	10-12'
NAS		

SB-10			
Compound	12-16'	24-25'	27-28'
NAS			

SP-5		
Compound	0-2'	10-12'
NAS		

SB-09		
Compound	12-16'	30-32'
NAS		

SP-10		
Compound	0-2'	10-12'
NAS		

SP-6				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	NAS	10.4

SP-11					
Compound	Track 1	Track 2	0-2'	6-8'	10-12'
4,4'-DDD	3.3	13000	NAS		
4,4'-DDE	3.3	1800	NAS	6.93	9.79

SP-12				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	16.6	7.87
4,4'-DDE	3.3	1800	7.01	8.11

SB-12			
Compound	12-16'	24-26'	26-28'
NAS			

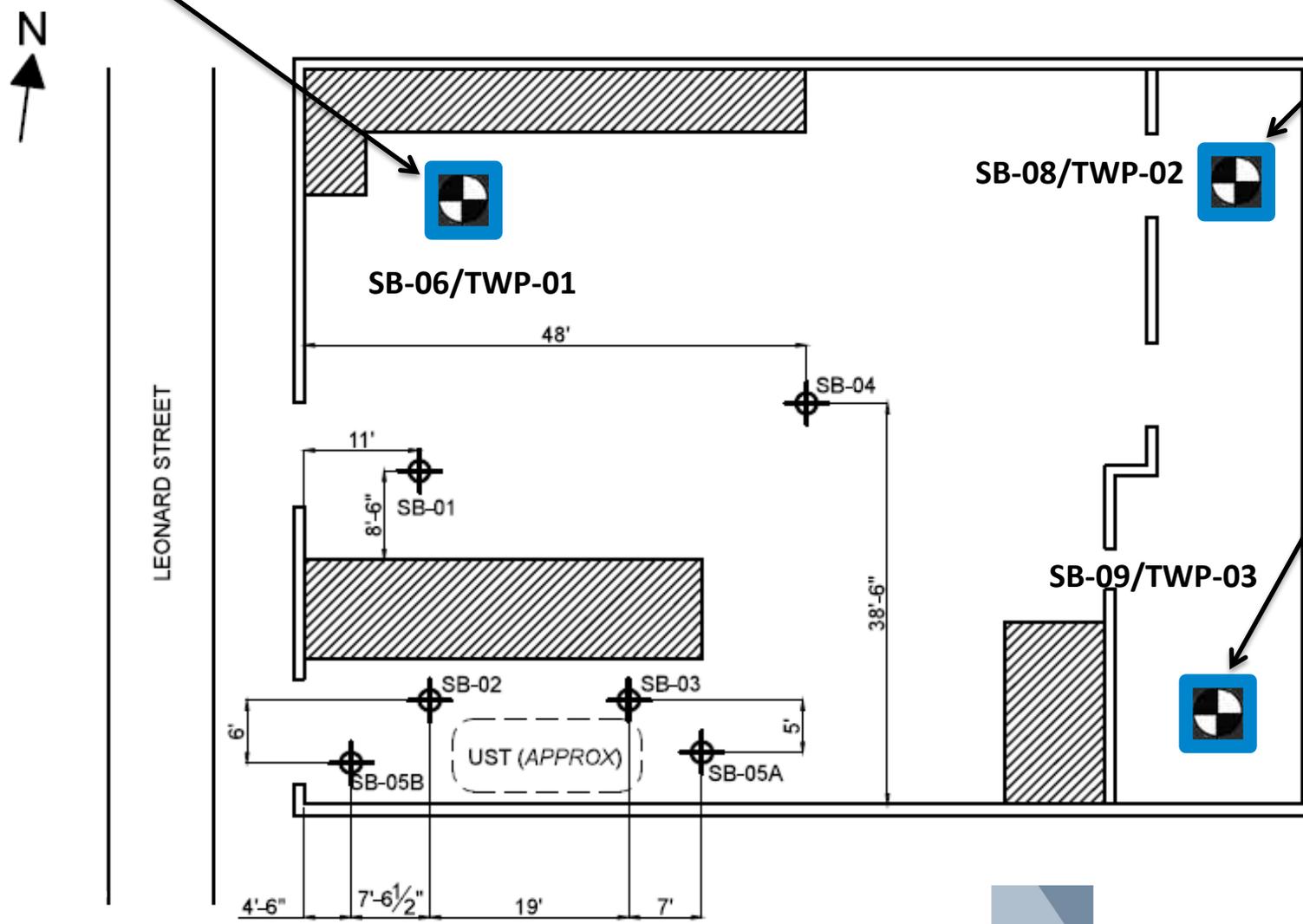


498 Leonard Street Brooklyn NY  
SOIL CONTAMINATION  
Pesticides in ug/kg  
Figure 6

TWP-01				
VOCs (ug/L)		TOGS	Total	
	1,2,4,5-Tetramethylbenzene	5	90.9	
	tert-Butylbenzene	5	43.5	
	Isopropylbenzene	5	33.7	
	n-Propylbenzene	5	8.99	
	n-Butylbenzene	5	63.4	
Metals (Dissolved) (mg/L)		TOGS	Dissolved	Total
	Arsenic	0.025	0.025	0.027
	Mercury	0.0007	0.0016	0.003

TWP-02				
VOCs (ug/L)		TOGS	Total	
	1,2,4-Trimethylbenzene	5	1.85	
	1,2,4,5-Tetramethylbenzene	5	135	
	tert-Butylbenzene	5	43.7	
	Isopropylbenzene	5	9.2	
	n-Butylbenzene	5	31.4	
Metals (Dissolved) (mg/L)		TOGS	Dissolved	Total
	Lead	0.025	0.036	0.049

TWP-03				
VOCs (ug/L)		TOGS	Total	
	1,2,4-Trimethylbenzene	5	7.78	
	1,2,4,5-Tetramethylbenzene	5	49.5	
	tert-Butylbenzene	5	19.8	
	Isopropylbenzene	5	70.7	
	4-Isopropyltoluene	5	5.02	
	n-Propylbenzene	5	121	
	n-Butylbenzene	5	42	
Metals (Dissolved) (mg/L)		TOGS	Dissolved	Total
	Lead	0.025	-	0.086



498 Leonard Street Brooklyn NY  
GROUNDWATER CONTAMINATION  
Figure 7

## LEGEND

Track 1 = NYSDEC Unrestricted Use Soil Cleanup Objectives

Track 2 = NYSDEC Restricted Use Soil Cleanup Objectives

Values that are **bold** exceed Track 1 SCOs

Values that are *underlined and italicized* exceed Track 2 SCOs



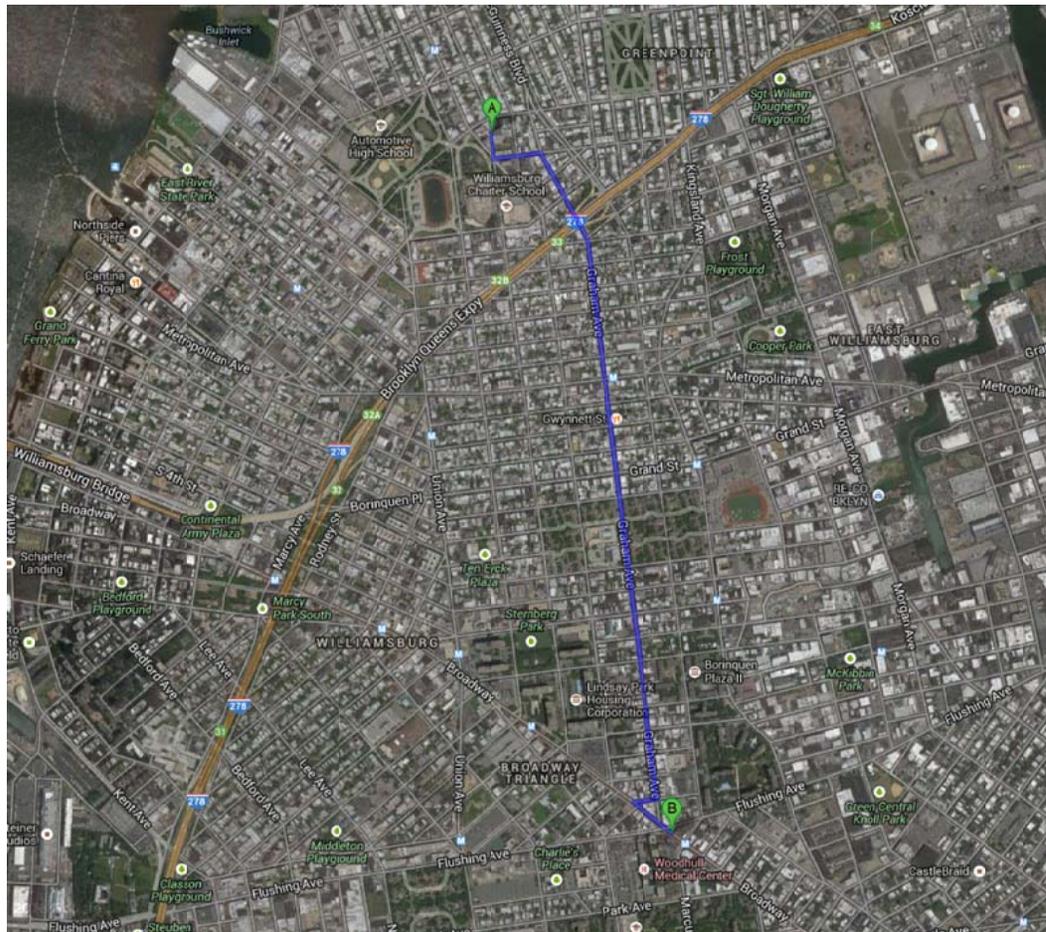
GRANT engineering soil boring locations



Hydro Tech Environmental Corp. soil probe locations



GRANT engineering Test Well locations



## DIRECTIONS

Project Site (498 Leonard St., Brooklyn, NY 11222) to Woodhull Medical Center - 1.7 mi, 8 minutes

1. Head south on Leonard Street toward Engert Ave - 0.3 mi
2. Turn right onto Meeker Ave - 0.2 mi
3. Turn left onto Union Ave - 0.7 mi
4. Turn left onto Broadway - 0.6 mi

Arrive: Woodhull Medical Center  
760 Broadway  
Brooklyn, NY 11206



498 LEONARD STREET  
BROOKLYN, NY 11222

Hospital Route Map - Figure 12

**TABLES**

1. Soil Analytical Data Summary
2. Groundwater Analytical Data Summary
3. Soil Vapor Analytical Data Summary

Table 1  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID	LabID	NYSDEC Part 375 Unrestricted Use (Track 1) SCOs	NYSDEC Part 375 Restricted Residential Use (Track 2) SCOs	SB-06A 11-13' 1304263-2 4/23/2013	SB-06B 24-25' 1304263-3 4/23/2013	SB-06C 30-32' 1304263-4 4/23/2013	SB-07A 10-13' 1304262-1 4/22/2013	SB-07B 19-21' 1304262-2 4/22/2013	SB-07C 26-28' 1304262-3 4/22/2013	SB-08A 12-16' 1304262-4 4/22/2013	SB-08B 20-24' 1304262-5 4/22/2013	SB-08C 32-34' 1304262-6 4/22/2013	SB-09A 12-16' 1304262-7 4/22/2013	SB-09B 30-32' 1304262-8 4/23/2013	SB-10A 12-16' 1304262-9 4/23/2013	SB-10B 24-25' 1304262-10 4/23/2013	SB-10C 27-28' 1304263-1 4/23/2013
Client/Matrix	RptUnits	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Compound	CASNumber	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
<b>Volatiles Organics, TCL (Target Compound List)</b>																	
Acetone	67-64-1	50	U	160	U	8.37	U	46.2	U	17.5	U	7.63	U	404	U	8.23	U
Carbon Tetrachloride	56-23-5	760	U	2.41	U	2.24	U	12.4	U	4.69	U	2.05	U	13.1	U	2.21	U
Chloroform	67-66-3	370	U	2.69	U	2.5	U	13.8	U	5.23	U	2.28	U	14.6	U	2.46	U
Benzene	71-43-2	60	U	2.49	U	2.32	U	12.8	U	4.84	U	2.11	U	13.5	U	2.28	U
1,1,1-Trichloroethane	71-55-6	680	U	2.42	U	2.26	U	12.5	U	4.71	U	2.06	U	13.2	U	2.22	U
Bromomethane	74-83-9	~	U	2.67	U	2.49	U	13.8	U	5.21	U	2.27	U	14.6	U	2.45	U
Chloromethane	74-87-3	~	U	1.98	U	1.85	U	10.2	U	3.86	U	1.68	U	10.8	U	1.82	U
Dibromomethane	74-95-3	~	U	2.13	U	1.98	U	11	U	4.14	U	1.81	U	11.6	U	1.95	U
Bromochloromethane	74-97-5	~	U	2.63	U	2.46	U	13.6	U	5.13	U	2.24	U	14.3	U	2.42	U
Chloroethane	75-00-3	~	U	2.66	U	2.48	U	13.7	U	5.18	U	2.26	U	14.5	U	2.44	U
Vinyl Chloride	75-01-4	20	U	2.93	U	2.73	U	15.1	U	5.7	U	2.49	U	15.9	U	2.68	U
Methylene Chloride	75-09-2	50	U	2.5	U	2.33	U	12.9	U	4.87	U	2.12	U	13.6	U	2.29	U
Carbon disulfide	75-15-10	2700	U	1.74	U	1.62	U	8.97	U	9.95	J	1.48	U	9.48	U	1.6	U
Bromoform	75-25-2	~	U	1.21	U	1.13	U	6.23	U	2.36	U	1.03	U	6.59	U	1.11	U
Bromodichloromethane	75-27-4	~	U	1.65	U	1.54	U	8.49	U	3.21	U	1.4	U	8.98	U	1.51	U
1,1-Dichloroethane	75-34-3	270	U	2.13	U	1.98	U	11	U	4.14	U	1.81	U	11.6	U	1.95	U
1,1-Dichloroethene	75-35-4	330	U	2.51	U	2.34	U	12.9	U	4.9	U	2.14	U	13.7	U	2.31	U
Tertiary butyl alcohol	75-65-0	121	U	20.1	U	18.7	U	103	U	39.1	U	17.1	U	109	U	19.5	U
Trichlorofluoromethane	75-69-4	~	U	2.54	U	2.37	U	13.1	U	4.95	U	2.16	U	13.8	U	2.33	U
Dichlorodifluoromethane	75-71-8	~	U	1.38	U	1.29	U	7.12	U	2.69	U	1.18	U	7.53	U	1.27	U
1,1,2-Trichlorotrifluoroethane (113 Freon)	76-13-1	6000	U	2.29	U	2.13	U	11.8	U	4.45	U	1.94	U	12.5	U	2.1	U
1,2-Dichloropropane	78-87-5	~	U	2.69	U	2.5	U	13.8	U	5.23	U	2.28	U	14.6	U	2.46	U
2-Butanone	78-93-3	300	U	4.83	U	4.5	U	24.9	U	9.4	U	4.1	U	116	U	4.43	U
1,1,2-Trichloroethane	79-00-5	~	U	2.54	U	2.37	U	13.1	U	4.95	U	2.16	U	13.8	U	2.33	U
Trichloroethene	79-01-6	470	U	2.31	U	2.16	U	11.9	U	4.51	U	1.97	U	12.6	U	2.12	U
1,1,2,2-Tetrachloroethane	79-34-5	600	U	2.65	U	2.47	U	13.6	U	5.15	U	2.25	U	14.4	U	2.43	U
1,2,3-Trichlorobenzene	87-61-6	20000	U	2.34	U	2.18	U	12.1	U	4.66	U	1.99	U	12.7	U	2.15	U
Hexachlorobutadiene	87-68-3	~	U	2.39	U	2.23	U	12.3	U	4.66	U	2.03	U	13	U	2.2	U
Naphthalene	91-20-3	12000	U	1.85	U	1.72	U	9.52	U	3.6	U	1.57	U	10.1	U	1.7	U
o-xylene	95-47-6	~	U	2.91	U	2.72	U	15	U	14	U	6.17	U	15.9	U	6.72	U
2-Chlorotoluene	95-49-8	~	U	3.07	U	2.86	U	15.8	U	5.98	U	2.61	U	16.7	U	2.82	U
1,2-Dichlorobenzene	95-50-1	1100	U	2.77	U	2.58	U	14.2	U	5.39	U	2.35	U	15.1	U	2.54	U
1,2,4-Trimethylbenzene	95-63-6	3600	U	2.9	U	2.7	U	14.9	U	5.65	U	2.46	U	15.8	U	2.66	U
1,2,4,5-Tetramethylbenzene	95-93-2	~	E	28.5	U	1.96	U	956	U	4.09	U	6.35	U	532	U	7.37	U
1,2-Dibromo-3-chloropropane	96-12-8	~	U	1.34	U	1.25	U	6.92	U	2.62	U	1.14	U	7.31	U	1.23	U
1,2,3-Trichloropropane	96-18-4	340	U	2.39	U	2.23	U	12.3	U	4.66	U	2.03	U	13	U	2.2	U
tert-Butylbenzene	98-82-8	5,900	E	16.1	U	2.58	U	1540	E	5.39	U	4.55	J	264	U	5.12	U
Isopropylbenzene	98-82-8	2,300	U	2.63	U	2.48	U	14.5	U	5.49	U	2.4	U	55.2	U	2.59	U
p-Isopropyltoluene	99-87-6	10000	U	2.86	U	2.67	U	14.7	U	5.57	U	2.43	U	15.6	U	2.62	U
Ethylbenzene	100-41-4	1000	U	2.35	U	2.19	U	12.1	U	4.58	U	2	U	12.8	U	2.16	U
Styrene	100-42-5	300000	U	2.41	U	2.24	U	12.4	U	4.69	U	2.05	U	13.1	U	2.21	U
n-Propylbenzene	103-65-1	3900	U	2.59	U	2.42	U	13.4	U	5.05	U	2.2	U	14.1	U	2.38	U
n-Butylbenzene	104-51-8	12000	E	22.3	U	2.67	U	1280	E	5.57	U	2.43	U	121	U	2.62	U
p-Diethylbenzene	105-05-5	~	E	2.63	U	2.46	U	4890	E	5.13	U	2.24	U	183	U	6.58	U
4-Chlorotoluene	106-43-4	~	U	2.75	U	2.57	U	14.2	U	5.36	U	2.34	U	15	U	2.53	U
1,4-Dichlorobenzene	106-46-7	1800	U	2.82	U	2.63	U	14.5	U	5.49	U	2.4	U	15.3	U	2.59	U
1,2-Dibromoethane	106-93-4	~	U	2.49	U	2.32	U	12.8	U	4.84	U	2.11	U	13.5	U	2.28	U
1,2-Dichloroethane	107-06-2	20	U	2.67	U	2.49	U	13.8	U	5.21	U	2.27	U	14.6	U	2.45	U
Acrylonitrile	107-13-1	~	U	5.17	U	4.82	U	26.6	U	10.1	U	4.4	U	48.2	U	4.75	U
4-Methyl-2-pentanone	108-10-1	1000	U	6.46	U	6.03	U	33.3	U	12.6	U	5.49	U	35.2	U	5.93	U
m,p-xylene	1330-20-7P/M	~	U	5.56	U	5.18	U	30.3	U	10.8	U	4.72	U	30.3	U	5.1	U
1,3,5-Trimethylbenzene	108-67-8	8400	U	2.87	U	2.68	U	14.8	U	5.59	U	2.44	U	15.6	U	2.64	U
Bromobenzene	108-86-1	~	U	2.89	U	2.69	U	14.9	U	5.62	U	2.45	U	15.7	U	2.65	U
Toluene	108-88-3	700	U	47.8	U	2.36	U	309	J	14.2	U	135	J	9.5	U	29.6	J
Chlorobenzene	108-90-7	1100	U	2.85	U	2.65	U	14.7	U	5.46	U	2.42	U	15.5	U	2.61	U
2-Chloroethylvinylether	110-75-8	~	U	3.83	U	3.57	U	19.7	U	7.46	U	3.25	U	20.9	U	3.51	U
1,2,4-Trichlorobenzene	120-82-1	20000	U	2.47	U	2.31	U	12.7	U	4.82	U	2.1	U	13.5	U	2.27	U
Dibromochloromethane	124-48-1	~	U	1.58	U	1.48	U	8.15	U	3.08	U	1.34	U	8.62	U	1.45	U
Tetrachloroethene	127-18-4	1300	U	2.85	U	2.65	U	14.7	U	5.54	U	2.42	U	15.5	U	2.61	U
sec-Butylbenzene	135-98-8	11000	U	59.2	U	2.7	U	14.9	U	5.65	U	2.46	U	15.8	U	2.66	U
1,3-Dichloropropane	142-28-9	300	U	2.91	U	2.72	U	15	U	5.67	U	2.47	U	15.9	U	2.67	U
c-1,2-Dichloroethene	156-59-2	250	U	2.46	U	2.29	U	12.7	U	4.79	U	2.09	U	13.4	U	2.26	U
t-1,2-Dichloroethene	156-60-5	190	U	2.42	U	2.26	U	12.5	U	4.71	U	2.06	U	13.2	U	2.22	U
1,3-Dichlorobenzene	541-73-1	2400	U	2.7	U	2.52	U	13.9	U	5.26	U	2.29	U	14.7	U	2.48	U
1,1-Dichloropropene	563-58-6	~	U	2.33	U	2.17	U	12	U	4.53	U	1.98	U	12.7	U	2.13	U
2,2-Dichloropropene	590-20-7	~	U	2.3	U	2.15	U	11.9	U	4.48	U	1.95	U	12.5	U	2.11	U
2-Hexanone	591-78-6	~	U	4.27	U	3.98	U	22	U	8.31	U	3.63	U	23.2	U	4.14	U
p-Ethyltoluene	622-96-8	~	U	2.85	U	2.65	U	14.7	U	5.54	U	2.42	U	15.5	U	2.61	U
1,1,1,2																	

Table 1  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date Client/Matrix RptUnits	NYSDEC Part 375 Unrestricted Use (Track 1) SCOs Soil	NYSDEC Part 375 Restricted Residential Use (Track 2) SCOs Soil	SB-06A 11-13' 1304263-2 4/23/2013 Soil mg/kg dry	SB-06B 24-25' 1304263-3 4/23/2013 Soil mg/kg dry	SB-06C 30-32' 1304263-4 4/23/2013 Soil mg/kg dry	SB-07A 10-13' 1304262-1 4/22/2013 Soil mg/kg dry	SB-07B 19-21' 1304262-2 4/22/2013 Soil mg/kg dry	SB-07C 26-28' 1304262-3 4/22/2013 Soil mg/kg dry	SB-08A 12-16' 1304262-4 4/22/2013 Soil mg/kg dry	SB-08B 20-24' 1304262-5 4/22/2013 Soil mg/kg dry	SB-08C 32-34' 1304262-6 4/22/2013 Soil mg/kg dry	SB-09A 12-16' 1304262-7 4/22/2013 Soil mg/kg dry	SB-09B 30-32' 1304262-8 4/22/2013 Soil mg/kg dry	SB-10A 12-16' 1304262-9 4/23/2013 Soil mg/kg dry	SB-10B 24-25' 1304262-10 4/23/2013 Soil mg/kg dry	SB-10C 27-28' 1304263-1 4/23/2013 Soil mg/kg dry										
Compound	CASNumber		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q												
1,3-Dichlorobenzene	541-73-1	2400	51.6	U	42.8	U	40	U	44.2	U	36.4	U	39.3	U	41.7	U	46.5	U	38.2	U	41.6	U	129	U	36.6	U
1,4-Dichlorobenzene	106-46-7	1800	45.8	U	38.1	U	35.6	U	39.3	U	74.4	U	32.4	U	34.9	U	37	U	41.4	U	33.9	U	114	U	32.5	U
2,3,4,6-Tetrachlorophenol	58-90-2	~	58	U	48.1	U	45	U	49.7	U	94	U	40.9	U	52.5	U	44.2	U	46.8	U	52.3	U	42.9	U	46.7	U
2,4,5-Trichlorophenol	95-95-4	100	24.1	U	20	U	18.7	U	20.7	U	39.1	U	17	U	21.9	U	18.4	U	19.5	U	21.8	U	17.8	U	19.4	U
2,4,6-Trichlorophenol	88-06-2	10000	47.8	U	39.7	U	37.1	U	41	U	77.5	U	33.7	U	43.3	U	36.4	U	38.6	U	43.1	U	35.3	U	38.5	U
2,4-Dichlorophenol	120-83-2	~	48.2	U	40.1	U	37.4	U	41.4	U	78.2	U	34	U	43.7	U	36.7	U	39	U	43.5	U	35.7	U	38.9	U
2,4-Dimethylphenol	105-67-9	~	51.8	U	43	U	40.1	U	44.4	U	83.9	U	36.5	U	46.9	U	39.4	U	41.8	U	46.7	U	38.3	U	41.7	U
2,4-Dinitrophenol	51-28-5	~	1600	U	1330	U	1240	U	1370	U	2590	U	1130	U	1450	U	1220	U	1290	U	1440	U	1180	U	1290	U
2,4-Dinitrotoluene	121-14-2	~	52.1	U	43.2	U	40.4	U	44.7	U	84.5	U	36.8	U	47.2	U	39.7	U	42.1	U	47	U	38.5	U	42	U
2,6-Dinitrotoluene	606-20-2	~	46.6	U	38.7	U	36.2	U	40	U	75.6	U	32.9	U	42.3	U	35.5	U	37.7	U	42.1	U	34.5	U	37.6	U
2-Chloronaphthalene	91-58-7	~	47.3	U	39.3	U	36.7	U	40.5	U	76.7	U	33.4	U	42.8	U	36	U	38.2	U	42.7	U	35	U	38.1	U
2-Chlorophenol	95-57-8	800	60.7	U	50.4	U	47.1	U	52.1	U	98.4	U	42.8	U	55	U	46.2	U	49	U	54.8	U	44.9	U	48.9	U
2-Methylnaphthalene	91-57-6	410	49.8	U	41.4	U	38.7	U	42.7	U	80.8	U	35.2	U	45.2	U	38	U	40.3	U	45	U	36.9	U	40.2	U
2-Methylphenol (o cresol)	95-48-7	330	46.2	U	38.3	U	35.8	U	39.6	U	74.9	U	32.6	U	35.2	U	35.2	U	37.3	U	41.6	U	34.2	U	37.2	U
2-Nitroaniline	88-74-4	~	20.9	U	17.4	U	16.2	U	17.9	U	33.9	U	14.8	U	19	U	15.9	U	16.9	U	18.9	U	15.5	U	16.9	U
2-Nitrophenol	88-75-5	300	21.1	U	17.5	U	16.4	U	18.1	U	34.2	U	14.9	U	19.1	U	16.1	U	17	U	19	U	15.6	U	17	U
3,4-Methylphenol	100-01-6	~	52.6	U	43.6	U	40.8	U	45.1	U	85.2	U	37.1	U	47.6	U	40	U	42.5	U	47.4	U	38.9	U	42.3	U
3,3'-Dichlorobenzidine	91-94-1	~	101	U	84.1	U	78.6	U	86.8	U	164	U	71.5	U	91.8	U	77.1	U	81.8	U	91.4	U	74.9	U	81.6	U
3-Nitroaniline	99-09-2	~	77.6	U	64.5	U	60.2	U	66.6	U	126	U	54.8	U	70.3	U	62.7	U	70	U	57.4	U	62.5	U	194	U
4,6-Dinitro-2-methylphenol	534-52-1	~	127	U	106	U	98.6	U	109	U	206	U	89.7	U	115	U	96.8	U	103	U	115	U	94.1	U	102	U
4-Bromophenyl phenyl ether	101-55-3	~	45.8	U	38.1	U	35.6	U	39.3	U	74.4	U	32.4	U	41.5	U	34.9	U	37	U	41.4	U	33.9	U	36.9	U
4-Chloro-3-methylphenol	59-50-7	~	46	U	38.2	U	35.7	U	39.5	U	74.6	U	32.5	U	41.7	U	35	U	37.2	U	41.5	U	34	U	37.1	U
4-Chloroaniline	106-47-8	220	69	U	57.3	U	53.5	U	59.2	U	112	U	48.7	U	62.5	U	52.6	U	55.7	U	62.2	U	51.1	U	55.6	U
4-Chlorophenyl phenyl ether	7005-72-3	~	34	U	28.2	U	26.4	U	29.2	U	55.2	U	24	U	30.8	U	25.9	U	27.5	U	30.7	U	25.2	U	27.4	U
4-Nitroaniline	100-02-7	~	61.2	U	50.8	U	47.5	U	52.5	U	99.2	U	43.2	U	55.4	U	46.6	U	49.4	U	55.2	U	45.3	U	49.3	U
4-Nitrophenol	56-57-5	100	60.7	U	50.4	U	47.1	U	52.1	U	98.4	U	42.8	U	55	U	46.2	U	49	U	54.8	U	44.9	U	48.9	U
Acenaphthene	83-32-9	20000	41.1	U	34.1	U	31.8	U	35.2	U	66.6	U	29	U	37.2	U	31.3	U	33.2	U	37	U	30.4	U	33.1	U
Acenaphthylene	208-96-8	100000	46.6	U	38.7	U	36.2	U	40	U	75.6	U	32.9	U	179	J	35.5	U	37.7	U	42.1	U	34.5	U	37.6	U
Aniline	62-53-3	100000	51.4	U	42.7	U	39.9	U	44.1	U	83.4	U	36.3	U	46.6	U	39.2	U	41.5	U	46.4	U	38.1	U	41.4	U
Anthracene	120-12-7	100000	56.9	U	47.2	U	44.1	U	48.8	U	92.2	U	40.1	U	7280	U	43.3	U	45.9	U	51.3	U	42.1	U	45.8	U
Benzo(a)anthracene	92-87-5	~	1350	U	1120	U	1050	U	1160	U	2200	U	956	U	1230	U	1030	U	1090	U	1220	U	1000	U	1090	U
Benzo(a)pyrene	56-55-3	1000	75.7	U	62.9	U	58.7	U	64.9	U	123	U	53.4	U	61.2	U	57.7	U	61.2	U	68.3	U	56	U	61	U
Benzo(b)fluoranthene	50-32-8	1000	193	J	59.9	U	56	U	61.9	U	117	U	51	U	11700	U	55	U	58.3	U	524	J	53.4	U	58.2	U
Benzo(b)fluoranthene	205-99-2	1000	188	J	58	U	54.2	U	59.9	U	113	U	49.3	U	9840	U	53.2	U	56.4	U	461	J	51.7	U	56.2	U
Benzo(g,h,i)perylene	191-24-2	100000	118	J	42.6	U	39.8	U	44	U	83.2	U	36.2	U	5830	U	39.1	U	41.4	U	285	J	37.9	U	50.2	U
Benzo(k)fluoranthene	207-08-9	800	108	U	89.4	U	83.5	U	92.3	U	175	U	76	U	8260	U	82	U	87	U	97.1	U	79.7	U	86.7	U
Benzoic acid	65-85-0	2700	18400	U	15300	U	14300	U	15800	U	29800	U	13000	U	16600	U	14000	U	14800	U	16600	U	13600	U	14800	U
Benzyl alcohol	100-51-6	~	43.1	U	35.8	U	33.5	U	37	U	69.9	U	30.4	U	39.1	U	32.8	U	34.8	U	38.9	U	31.9	U	34.7	U
Butyl benzyl phthalate	85-68-7	122000	82.1	U	68.2	U	63.7	U	70.4	U	133	U	57.9	U	74.4	U	62.5	U	66.3	U	74.1	U	60.8	U	66.2	U
Carbazole	86-74-8	~	92	U	76.4	U	71.4	U	78.9	U	149	U	64.9	U	83.4	U	70.1	U	74.3	U	83	U	68.1	U	74.1	U
Chrysene	218-01-9	1000	71.2	U	59.2	U	55.3	U	61.1	U	116	U	50.3	U	9670	U	54.3	U	57.5	U	64.3	U	52.7	U	57.4	U
Cresols	~	330	98.8	U	81.9	U	76.6	U	84.7	U	160	U	69.7	U	89.4	U	75.2	U	79.8	U	89	U	73.1	U	79.5	U
Di-n-butyl phthalate	84-74-2	~	70.4	U	58.5	U	54.6	U	60.4	U	114	U	49.7	U	63.8	U	53.6	U	56.9	U	63.5	U	52.1	U	56.8	U
Di-n-octyl phthalate	117-84-0	~	62.8	U	52.8	U	49.4	U	53.8	U	102	U	44.3	U	56.9	U	47.8	U	50.7	U	56.6	U	46.5	U	50.6	U
Dibenz(a,h)anthracene	53-70-3	330	58.8	U	48.8	U	45.6	U	50.4	U	95.3	U	41.5	U	1900	U	44.8	U	47.5	U	135	U	43.5	U	47.4	U
Dibenzofuran	132-64-9	~	40.9	U	34	U	31.7	U	35.1	U	66.3	U	28.9	U	37	U	31.1	U	33	U	36.9	U	30.3	U	32.9	U
Diethyl phthalate	84-66-2	7100	67.7	U	56.2	U	52.5	U	58.1	U	110	U	47.8	U	61.4	U	51.6	U	54.7	U	61.9	U	50.1	U	54.6	U
Dimethyl phthalate	131-11-3	~	54.6	U	45.4	U	42.4	U	46.8	U	88.6	U	38.6	U	49.5	U	41.6	U	44.1	U	49.3	U	40.4	U	44	U
Fluoranthene	206-44-0	100000	419	U	59.9	U	56	U	89	U	117	U	51	U	11200	U	88.8	U	58.3	U	754	U	53.4	U	69.5	U
Fluorene	86-73-7	30000	47	U	39	U	36.4	U	40.3	U	76.2	U	33.1	U	42.5	U	35.8	U	37.9	U	42.4	U	34.8	U	37.8	U
Hexachlorobenzene	118-74-1	330	56.2	U	46.7	U	43.6	U	48.2	U	91.2	U	39.7	U	50.9	U	42.8	U	45.4	U	50.7	U	41.6	U	45.3	U
Hexachlorobutadiene	87-68-3	~	55.3	U	45.9	U	42.9	U	47.4	U	89.6	U	39	U	50.1	U	42.1	U	44.6	U	49.9	U	40.9	U	44.5	U
Hexachlorocyclopentadiene	77-47-4	~	16.8	U	13.9	U	13	U	14.4	U	27.2	U	11.8	U	15.2	U	12.8	U	13.5	U	15.1	U	12.4	U		

Table 1  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date Client/Matrix RptUnits	NYSDEC Part 375 Unrestricted Use (Track 1) SCOs Soil	NYSDEC Part 375 Restricted Residential Use (Track 2) SCOs Soil	SB-06A 11-13' 1304263-2 4/23/2013 Soil		SB-06B 24-25' 1304263-3 4/23/2013 Soil		SB-06C 30-32' 1304263-4 4/23/2013 Soil		SB-07A 10-13' 1304262-1 4/22/2013 Soil		SB-07B 19-21' 1304262-2 4/22/2013 Soil		SB-07C 26-28' 1304262-3 4/22/2013 Soil		SB-08A 12-16' 1304262-4 4/22/2013 Soil		SB-08B 20-24' 1304262-5 4/22/2013 Soil		SB-08C 32-34' 1304262-6 4/22/2013 Soil		SB-09A 12-16' 1304262-7 4/22/2013 Soil		SB-09B 30-32' 1304262-8 4/22/2013 Soil		SB-10A 12-16' 1304262-9 4/23/2013 Soil		SB-10B 24-25' 1304262-10 4/23/2013 Soil		SB-10C 27-28' 1304263-1 4/23/2013 Soil				
			Compound	CASNumber	Result	Q	Result	Q	Result	Q	Result	Q																					
Total PCBs	1336-36-3	100	ND		ND		ND		ND																								
alpha-BHC	319-84-6	20	1.05	U	0.88	U	0.82	U	0.9	U	1.71	U	0.74	U	0.96	U	0.8	U	0.85	U	0.95	U	0.78	U	0.85	U	2.63	U	0.75	U	U		
gamma-BHC (Lindane)	58-89-9	100	1.33	U	1.1	U	1.03	U	1.14	U	2.15	U	0.94	U	1.2	U	1.01	U	1.07	U	1.2	U	0.98	U	1.07	U	3.31	U	0.94	U	U		
beta-BHC	319-85-7	36	0.86	U	0.72	U	0.67	U	0.74	U	1.4	U	0.61	U	0.78	U	0.66	U	0.7	U	0.78	U	0.64	U	0.69	U	2.15	U	0.61	U	U		
delta-BHC	319-86-8	40	1.81	U	1.5	U	1.4	U	1.55	U	2.93	U	1.27	U	1.64	U	1.37	U	1.46	U	1.63	U	1.34	U	1.45	U	4.5	U	1.28	U	U		
Heptachlor	76-44-8	42	1.49	U	1.23	U	1.15	U	1.27	U	2.41	U	1.05	U	1.35	U	1.13	U	1.2	U	1.34	U	1.1	U	1.2	U	3.71	U	1.05	U	U		
Aldrin	309-00-2	5	1.68	U	1.39	U	1.3	U	1.44	U	2.72	U	1.18	U	1.52	U	1.28	U	1.35	U	1.51	U	1.24	U	1.35	U	4.18	U	1.19	U	U		
Heptachlor epoxide	1024-57-3	20	1.58	U	3.63	J	1.23	U	1.36	U	2.56	U	1.12	U	1.43	U	1.2	U	1.28	U	1.43	U	1.17	U	1.27	U	3.94	U	1.12	U	U		
gamma-Chlordane	5103-74-2	540	1.69	U	6.39	J	1.31	U	1.45	U	2.75	U	1.2	U	1.53	U	1.29	U	1.37	U	1.53	U	1.25	U	1.36	U	4.22	U	1.2	U	U		
alpha-Chlordane	5103-71-9	94	1.42	U	14.3		1.1	U	1.22	U	2.31	U	1	U	1.29	U	1.08	U	1.15	U	1.28	U	1.05	U	1.15	U	3.55	U	1.01	U	U		
4,4'-DDE	72-55-9	3.3	1.71	U	1.42	U	1.33	U	1.47	U	2.77	U	1.21	U	1.55	U	1.38	U	1.54	U	1.38	U	1.26	U	1.38	U	4.26	U	1.21	U	U		
Endosulfan I	959-98-8	2400	1.63	U	1.35	U	1.26	U	1.4	U	2.64	U	1.15	U	1.48	U	1.24	U	1.32	U	1.47	U	1.21	U	1.31	U	4.06	U	1.16	U	U		
Dieldrin	60-57-1	5	1.82	U	1.51	U	1.41	U	1.56	U	2.95	U	1.29	U	1.65	U	1.39	U	1.47	U	1.64	U	1.35	U	1.47	U	4.54	U	1.29	U	U		
Endrin	72-20-8	14	1.65	U	1.37	U	1.28	U	1.41	U	2.87	U	1.16	U	1.49	U	1.25	U	1.33	U	1.48	U	1.22	U	1.33	U	4.1	U	1.17	U	U		
4,4'-DDD	72-54-8	3.3	54.9		0.6	U	0.56	U	0.62	U	1.17	U	0.51	U	0.65	U	0.55	U	0.58	U	0.65	U	0.53	U	0.58	U	1.79	U	0.51	U	U		
Endosulfan II	33213-65-9	2400	1.29	U	1.07	U	1	U	1.11	U	2.1	U	0.91	U	1.17	U	0.99	U	1.05	U	1.17	U	0.96	U	1.04	U	3.23	U	0.92	U	U		
4,4'-DDT	50-29-3	3.3	0.86	U	0.72	U	0.67	U	0.74	U	1.4	U	0.61	U	0.78	U	0.66	U	0.7	U	0.78	U	0.64	U	0.69	U	2.15	U	0.61	U	U		
Endosulfan sulfate	1031-07-8	2400	1.15	U	0.95	U	0.89	U	0.99	U	1.87	U	0.81	U	1.04	U	0.88	U	0.93	U	1.04	U	0.85	U	0.93	U	2.87	U	0.82	U	U		
Endrin Aldehyde	7421-93-4	~	1.2	U	0.99	U	0.93	U	1.03	U	1.94	U	0.85	U	1.09	U	0.91	U	0.97	U	1.08	U	0.89	U	0.97	U	2.99	U	0.85	U	U		
Methoxychlor	72-43-5	1200	1.41	U	1.17	U	1.09	U	1.21	U	2.28	U	0.99	U	1.27	U	1.07	U	1.14	U	1.27	U	1.04	U	1.13	U	3.51	U	1	U	U		
Endrin ketone	53494-70-5	~	1.52	U	1.26	U	1.18	U	1.3	U	2.46	U	1.07	U	1.37	U	1.16	U	1.23	U	1.37	U	1.12	U	1.22	U	3.78	U	1.08	U	U		
Toxaphene	8001-35-2	~	58.3	U	48.4	U	45.2	U	50	U	94.6	U	41.1	U	52.8	U	44.4	U	47.1	U	52.6	U	43.1	U	47	U	145	U	41.4	U	U		
Chlordane	57-74-9	~	11.1	U	9.23	U	8.62	U	9.53	U	18	U	7.85	U	10.1	U	8.47	U	8.98	U	10	U	8.23	U	8.96	U	27.7	U	7.89	U	U		
2,4-D	94-75-7	500	160	U	133	U	124	U	137	U	259	U	113	U	145	U	122	U	129	U	144	U	118	U	129	U	398	U	113	U	U		
2,4,5-T	93-76-5	1900	160	U	133	U	124	U	137	U	259	U	113	U	145	U	122	U	129	U	144	U	118	U	129	U	398	U	113	U	U		
Silvex(2,4,5-TP)	93-72-1	3800	160	U	133	U	124	U	137	U	259	U	113	U	145	U	122	U	129	U	144	U	118	U	129	U	398	U	113	U	U		
<b>Metals, Target Analyte List</b>		mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry	mg/kg dry		
Aluminum	7429-90-5	~	~	3420		8210		4500		3620		6690		4780		5090		3550		4770		4730		3000		1870		4880		2900		U	
Antimony	7440-36-0	~	~	0.73	U	0.45	U	0.58	U	0.63	U	1.15	U	0.31	U	0.7	U	0.46	U	0.53	U	0.63	U	0.4	U	0.54	U	1.62	U	0.38	U	U	
Arsenic	7440-38-2	13	10.8		1.5	U	0.26		17.6		3.08		0.13	U	5.79		1.29		0.6		4.29		1.38		74.5		2.2		3.29		U		
Barium	7440-39-3	350	268		38.1		35.2		220		102		41.5		166		16.3		38.4		90.9		16.6		272		206		18		U		
Beryllium	7440-41-7	7.2	0.36		0.43		0.17		0.35		0.96		0.29		0.23		0.25		0.2		0.34		0.21		0.16		0.58		0.21		U		
Cadmium	7440-43-9	2.5	0.032		0.02	U	0.026	U	0.13		0.4		0.014	U	0.055		0.021	U	0.024	U	0.028	U	0.03	U	0.024	U	0.13		0.017		U		
Calcium	7440-70-2	~	8330		1260		7400		8930		700		6470		616		10600		6720		10380		5920		24700		587		24700		587		U
Chromium	7440-47-3	30	28.9		13.2		12.5		8.86		13.7		11.2		9.61		9.51		14.6		11.6		7.84		21.2		20.9		13.4		U		
Cobalt	7440-48-4	20	13.4		5.93		4.88		5.33		2.03		3.99		3.09		4.76		5.19		4.3		2.96		4.09		0.9		3.86		U		
Copper	7440-50-8	50	225		22.3		15.3		87.7		46		13.8		36.8		9.33		15.8		24.6		7.73		160		17.5		8.82		U		
Iron	7439-89-6	~	115000		16900		12400		10500		9210		25100		10900		10100		14700		23000		9190		62200		5210		11600		U		
Lead	7439-92-1	63	414		15.7		3.66		1440		30.5		3.94		332		4.22		3.77		126		3.03		605		18.5		4.31		U		
Magnesium	7439-95-4	~	961		3400		5390		486		2240		771		784		1620		6050		3170		1080		568		3700		1370		U		
Manganese	7439-96-5	1600	233		88.7		151		128		60.3		149		152		43.5		126		203		34.6		120		20.3		40.3		U		
Nickel	7440-02-0	30	27.7		15		9.1		8.43		8.76		7.33		5.53</																		

Table 1  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix RptUnits	NYSDEC Part 375 Unrestricted Use (Track 1) SCOs Soil	NYSDEC Part 375 Restricted Residential Use (Track 2) SCOs Soil	SB-11A 12-15' 1304263-5 4/23/2013 Soil mg/kg dry	SB-11B 26-28' 1304263-6 4/23/2013 Soil mg/kg dry	SB-12A 12-16' 1304263-7 4/23/2013 Soil mg/kg dry	SB-12B 24-26' 1304263-8 4/23/2013 Soil mg/kg dry	SB-12C 26-28' 1304263-9 4/23/2013 Soil mg/kg dry						
Compound	CASNumber	ug/kg dry	ug/kg dry	Result	Q	Result	Q	Result	Q	Result	Q		
<b>Volatile Organics, TCL (Target Compound List)</b>		ug/kg dry	ug/kg dry	ug/kg dry	Q	ug/kg dry	Q	ug/kg dry	Q	ug/kg dry	Q		
Acetone	67-64-1	50	100000	45.6	U	8.37	U	53	U	102	U	8.44	U
Carbon Tetrachloride	56-23-5	760	2400	12.2	U	2.24	U	14.2	U	27.3	U	2.26	U
Chloroform	67-66-3	370	49000	13.6	U	2.5	U	15.9	U	30.5	U	2.53	U
Benzene	71-43-2	60	4800	12.6	U	2.32	U	14.7	U	28.2	U	2.34	U
1,1,1-Trichloroethane	71-55-6	680	100000	12.3	U	2.26	U	14.3	U	27.5	U	2.28	U
Bromomethane	74-83-9	~	~	13.6	U	2.49	U	15.8	U	30.4	U	2.51	U
Chloromethane	74-87-3	~	~	10.1	U	1.85	U	11.7	U	22.5	U	1.86	U
Dibromomethane	74-95-3	~	~	10.8	U	1.98	U	12.6	U	24.2	U	2	U
Bromochloromethane	74-97-5	~	~	13.4	U	2.46	U	15.5	U	29.9	U	2.47	U
Chloroethane	75-00-3	~	~	13.5	U	2.48	U	15.7	U	30.2	U	2.5	U
Vinyl Chloride	75-01-4	20	900	14.9	U	2.73	U	17.3	U	33.2	U	2.75	U
Methylene Chloride	75-09-2	50	100000	12.7	U	2.33	U	14.8	U	28.4	U	2.35	U
Carbon disulfide	75-15-10	2700	100000	13.2	U	1.62	U	10.3	U	19.8	U	1.64	U
Bromofom	75-25-2	~	~	6.14	U	1.13	U	7.14	U	13.7	U	1.14	U
Bromodichloromethane	75-27-4	~	~	8.37	U	1.54	U	9.73	U	18.7	U	1.55	U
1,1-Dichloroethane	75-34-3	270	26000	10.8	U	1.98	U	12.6	U	24.2	U	2	U
1,1-Dichloroethene	75-35-4	330	100000	12.8	U	2.34	U	14.8	U	28.5	U	2.36	U
Tertiary butyl alcohol	75-65-0	~	~	102	U	18.7	U	119	U	228	U	18.9	U
Trichlorofluoromethane	75-69-4	~	~	12.9	U	2.37	U	15	U	28.8	U	2.39	U
Dichlorodifluoromethane	75-71-8	~	~	7.02	U	1.29	U	8.16	U	15.7	U	1.3	U
1,1,2-Trichlorotrifluoroethane (113 Freon)	76-13-1	6000	100000	11.6	U	2.13	U	13.5	U	26	U	2.15	U
1,2-Dichloropropane	78-87-5	~	~	13.6	U	2.5	U	15.9	U	30.5	U	2.53	U
2-Butanone	78-93-3	300	100000	24.5	U	4.5	U	28.5	U	54.8	U	4.54	U
1,1,2-Trichloroethane	79-00-5	~	~	12.9	U	2.37	U	15	U	28.8	U	2.39	U
Trichloroethene	79-01-6	470	21000	11.7	U	2.16	U	13.7	U	26.3	U	2.17	U
1,1,2,2-Tetrachloroethane	79-34-5	600	35000	13.4	U	2.47	U	15.6	U	30	U	2.49	U
1,2,3-Trichlorobenzene	87-61-6	20000	~	11.9	U	2.18	U	13.8	U	26.6	U	2.2	U
Hexachlorobutadiene	87-68-3	~	~	12.1	U	2.23	U	14.1	U	27.2	U	2.25	U
Naphthalene	91-20-3	12000	100000	9.38	U	1.72	U	435	U	409	U	5.48	J
o-xylene	95-47-6	~	~	14.8	U	2.72	U	108	U	142	U	2.74	U
2-Chlorotoluene	95-49-8	~	~	15.6	U	2.86	U	18.1	U	34.9	U	2.89	U
1,2-Dichlorobenzene	95-50-1	1100	100000	14	U	2.58	U	16.3	U	31.4	U	2.6	U
1,2,4-Trimethylbenzene	95-63-6	3600	52000	14.7	U	2.7	U	364	U	473	U	2.72	U
1,2,4,5-Tetramethylbenzene	95-93-2	~	~	1490	E	1.96	U	1820	E	763	U	10.7	U
1,2-Dibromo-3-chloropropane	96-12-8	~	~	6.82	U	1.25	U	7.93	U	15.3	U	1.26	U
1,2,3-Trichloropropane	96-18-4	340	80000	693	U	2.23	U	14.1	U	27.2	U	2.25	U
tert-Butylbenzene	98-82-8	5,900	100000	1020	U	2.58	U	246	U	113	U	2.6	U
Isopropylbenzene	98-82-8	2,300	100,000	234	U	2.63	U	384	U	230	U	2.65	U
p-Isopropyltoluene	99-87-6	10000	~	14.5	U	2.67	U	86.3	U	130	U	2.69	U
Ethylbenzene	100-41-4	1000	41000	11.9	U	2.19	U	281	U	240	U	2.21	U
Styrene	100-42-5	300000	~	12.2	U	2.24	U	14.2	U	27.3	U	2.26	U
n-Propylbenzene	103-65-1	3900	100000	207	U	2.42	U	684	U	389	U	2.44	U
n-Butylbenzene	104-51-8	12000	100000	1490	E	2.67	U	803	U	381	U	2.69	U
p-Diethylbenzene	105-05-5	~	~	13.4	E	2.46	U	370	U	234	U	2.47	U
4-Chlorotoluene	106-43-4	~	~	14	U	2.57	U	16.2	U	31.3	U	2.59	U
1,4-Dichlorobenzene	106-46-7	1800	13000	14.3	U	2.63	U	16.6	U	32	U	2.65	U
1,2-Dibromoethane	106-93-4	~	~	12.6	U	2.32	U	14.7	U	28.2	U	2.34	U
1,2-Dichloroethane	107-06-2	20	3100	13.6	U	2.49	U	15.8	U	30.4	U	2.51	U
Acrylonitrile	107-13-1	~	~	26.3	U	4.82	U	30.5	U	58.7	U	4.86	U
4-Methyl-2-pentanone	108-10-1	1000	~	32.8	U	6.03	U	38.2	U	73.4	U	6.07	U
m,p-xylene	1330-20-7P/M	~	~	28.2	U	5.18	U	90.1	U	106	U	5.22	U
1,3,5-Trimethylbenzene	108-67-8	8400	52000	14.6	U	2.68	U	125	U	135	U	2.7	U
Bromobenzene	108-86-1	~	~	14.6	U	2.69	U	17	U	32.8	U	2.71	U
Toluene	108-88-3	700	100000	24.7	U	2.39	U	14.9	U	35.7	U	4.6	J
Chlorobenzene	108-90-7	1100	100000	14.4	U	2.65	U	16.8	U	32.3	U	2.67	U
2-Chloroethylvinylether	110-75-8	~	~	19.4	U	3.57	U	22.6	U	43.5	U	3.6	U
1,2,4-Trichlorobenzene	120-82-1	20000	~	12.6	U	2.31	U	14.6	U	28.1	U	2.33	U
Dibromochloromethane	124-48-1	~	~	8.03	U	1.48	U	9.34	U	18	U	1.49	U
Tetrachloroethene	127-18-4	1300	19000	14.4	U	2.65	U	16.8	U	32.3	U	2.67	U
sec-Butylbenzene	135-98-8	11000	100000	14.7	U	2.7	U	1320	E	451	U	2.72	U
1,3-Dichloropropane	142-28-9	300	~	14.8	U	2.72	U	17.2	U	33.1	U	2.74	U
c-1,2-Dichloroethene	156-59-2	250	100000	12.5	U	2.29	U	14.5	U	27.9	U	2.31	U
t-1,2-Dichloroethene	156-60-5	190	100000	12.3	U	2.26	U	14.3	U	27.5	U	2.28	U
1,3-Dichlorobenzene	541-73-1	2400	49000	13.7	U	2.52	U	15.9	U	30.7	U	2.54	U
1,1-Dichloropropene	563-58-6	~	~	11.8	U	2.17	U	13.7	U	26.4	U	2.19	U
2,2-Dichloropropene	590-20-7	~	~	11.7	U	2.15	U	13.6	U	26.1	U	2.16	U
2-Hexanone	591-78-6	~	~	21.7	U	3.98	U	25.2	U	48.5	U	4.01	U
p-Ethyltoluene	622-96-8	~	~	14.4	U	2.65	U	149	U	144	U	2.67	U
1,1,1,2-Tetrachloroethane	630-20-6	~	~	12.6	U	2.31	U	14.6	U	28.1	U	2.33	U
TAME	994-05-08	~	~	11.9	U	2.18	U	13.8	U	26.6	U	2.2	U
Methyl t-butyl ether	1634-04-4	930	100000	11.6	U	2.13	U	13.5	U	26	U	2.15	U
c-1,3-Dichloropropene	10061-01-05	~	~	13.1	U	2.41	U	15.2	U	29.3	U	2.42	U
t-1,3-Dichloropropene	10061-02-6	~	~	9.79	U	1.8	U	11.4	U	21.9	U	1.81	U
<b>Semi-Volatiles, EPA TCL List</b>		ug/kg dry	ug/kg dry	ug/kg dry	Q	ug/kg dry	Q	ug/kg dry	Q	ug/kg dry	Q		
1,2,4-Trichlorobenzene	120-82-1	~	~	53.3	U	48.9	U	62	U	119	U	49.4	U
1,2-Dichlorobenzene	95-50-1	1100	100000	43.2	U	39.6	U	50.2	U	96.4	U	40	U
1,2-Diphenylhydrazine	122-66-7	~	~	48.9	U	44.8	U	56.8	U	109	U	45.3	U

Table 1  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix RptUnits		NYSDEC Part 375 Unrestricted Use (Track 1) SCOs Soil	NYSDEC Part 375 Restricted Residential Use (Track 2) SCOs Soil	SB-11A 12-15' 1304263-5 4/23/2013 Soil mg/kg dry	Q	SB-11B 26-28' 1304263-6 4/23/2013 Soil mg/kg dry	Q	SB-12A 12-16' 1304263-7 4/23/2013 Soil mg/kg dry	Q	SB-12B 24-26' 1304263-8 4/23/2013 Soil mg/kg dry	Q	SB-12C 26-28' 1304263-9 4/23/2013 Soil mg/kg dry	Q
Compound	CASNumber			Result	Q								
1,3-Dichlorobenzene	541-73-1	2400	49000	43.6	U	40	U	50.7	U	97.3	U	40.4	U
1,4-Dichlorobenzene	106-46-7	1800	13000	38.7	U	35.5	U	45.1	U	86.4	U	35.9	U
2,3,4,6-Tetrachlorophenol	58-90-2	~	~	49	U	44.9	U	57	U	109	U	45.4	U
2,4,5-Trichlorophenol	95-95-4	100	100000	20.4	U	18.7	U	23.7	U	45.5	U	18.9	U
2,4,6-Trichlorophenol	88-06-2	10000	~	40.4	U	37	U	46.9	U	90.1	U	37.4	U
2,4-Dichlorophenol	120-83-2	~	~	40.8	U	37.4	U	47.4	U	91	U	37.8	U
2,4-Dimethylphenol	105-67-9	~	~	43.7	U	40.1	U	50.9	U	97.6	U	40.5	U
2,4-Dinitrophenol	51-28-5	~	~	1350	U	1240	U	1570	U	3010	U	1250	U
2,4-Dinitrotoluene	121-14-2	~	~	44	U	40.3	U	51.2	U	98.2	U	40.8	U
2,6-Dinitrotoluene	606-20-2	~	~	39.4	U	36.1	U	45.8	U	88	U	36.5	U
2-Chloronaphthalene	91-58-7	~	~	39.9	U	36.6	U	46.5	U	89.2	U	37	U
2-Chlorophenol	95-57-8	800	100000	51.3	U	47	U	59.7	U	114	U	47.5	U
2-Methylnaphthalene	91-57-6	410	410	42.1	U	38.6	U	49	U	94	U	39	U
2-Methylphenol (o cresol)	95-48-7	330	100000	39	U	35.8	U	45.4	U	87	U	36.1	U
2-Nitroaniline	88-74-4	~	~	17.7	U	16.2	U	20.6	U	39.5	U	16.4	U
2-Nitrophenol	88-75-5	300	~	17.8	U	16.3	U	20.7	U	39.8	U	16.5	U
3+4-Methylphenol	100-01-6	~	~	44.4	U	40.7	U	51.6	J	99.1	U	41.1	U
3,3'-Dichlorobenzidine	91-94-1	~	~	85.6	U	78.5	U	99.5	U	191	U	79.3	U
3-Nitroaniline	99-09-2	~	~	65.6	U	60.1	U	76.3	U	146	U	60.8	U
4,6-Dinitro-2-methylphenol	534-52-1	~	~	107	U	98.5	U	125	U	240	U	99.5	U
4-Bromophenyl phenyl ether	101-55-3	~	~	38.7	U	35.5	U	45.1	U	86.4	U	35.9	U
4-Chloro-3-methylphenol	59-50-7	~	~	38.9	U	35.6	U	45.2	U	86.7	U	36	U
4-Chloroaniline	106-47-8	220	100000	58.3	U	53.5	U	67.8	U	130	U	54	U
4-Chlorophenyl phenyl ether	7005-72-3	~	~	28.7	U	26.4	U	33.4	U	64.2	U	26.6	U
4-Nitroaniline	100-02-7	~	~	51.7	U	47.4	U	60.1	U	115	U	47.9	U
4-Nitrophenol	56-57-5	100	~	51.3	U	47	U	59.7	U	114	U	47.5	U
Acenaphthene	83-32-9	20000	100000	34.7	U	31.8	U	40.3	U	77.4	U	32.1	U
Acenaphthylene	208-96-8	100000	100000	39.4	U	36.1	U	45.8	U	88	U	36.5	U
Aniline	62-53-3	330	100000	43.5	U	39.9	U	50.5	U	97	U	40.3	U
Anthracene	120-12-7	100000	100000	48	U	44.1	U	55.9	U	107	U	44.5	U
Benzo(a)anthracene	56-55-3	1000	1000	1140	U	1050	U	1330	U	2550	U	1060	U
Benzo(a)pyrene	50-32-8	1000	1000	64	U	58.7	U	74.4	U	143	U	59.3	U
Benzo(b)fluoranthene	205-99-2	1000	1000	167	J	55.9	U	165	J	136	U	56.5	U
Benzo(g,h,i)perylene	191-24-2	100000	100000	185	J	54.1	U	152	J	132	U	54.6	U
Benzo(k)fluoranthene	207-08-9	800	3900	89.1	J	39.7	U	64.4	J	96.7	U	40.1	U
Benzoic acid	65-85-0	2700	100000	91	U	83.4	U	106	U	203	U	84.3	U
Benzyl alcohol	100-51-6	~	~	15500	U	14200	U	18100	U	34600	U	14400	U
Butyl benzyl phthalate	85-68-7	122000	100000	36.4	U	33.4	U	42.4	U	81.3	U	33.8	U
Carbazole	86-74-8	~	~	69.4	U	63.6	U	80.7	U	155	U	64.3	U
Chrysene	218-01-9	1000	3900	77.7	U	71.3	U	90.4	U	173	U	72	U
Cresols	330	100000	100000	60.2	U	55.2	U	70	U	134	U	55.8	U
Di-n-butyl phthalate	84-74-2	~	~	83.4	U	76.5	U	516	U	186	U	77.2	U
Di-n-octyl phthalate	117-84-0	~	~	59.5	U	54.6	U	69.2	U	133	U	55.1	U
Dibenz(a,h)anthracene	53-70-3	330	330	53	U	89.1	U	61.7	U	205	U	184	U
Dibenzofuran	132-64-9	~	~	49.7	U	45.5	U	57.8	U	111	U	46	U
Diethyl phthalate	84-66-2	7100	100000	34.5	U	31.7	U	40.2	U	77.1	U	32	U
Dimethyl phthalate	131-11-3	~	~	57.2	U	52.5	U	66.6	U	128	U	53	U
Fluoranthene	206-44-0	100000	100000	46.2	U	42.3	U	53.7	U	103	U	42.8	U
Fluorene	86-73-7	30000	100000	385	J	55.9	U	341	J	136	U	56.5	U
Hexachlorobenzene	118-74-1	330	410	39.7	U	36.4	U	46.2	U	88.6	U	36.8	U
Hexachlorobutadiene	87-68-3	~	~	47.5	U	43.6	U	55.3	U	106	U	44	U
Hexachlorocyclopentadiene	77-47-4	~	~	46.7	U	42.8	U	54.3	U	104	U	43.3	U
Hexachloroethane	67-72-1	~	~	14.2	U	13	U	16.5	U	31.6	U	13.1	U
Indeno(1,2,3-cd)pyrene	193-39-5	500	500	48.4	U	44.4	U	56.4	U	108	U	44.9	U
Isophorone	78-59-1	4400	100000	83.7	U	43.8	U	55.6	U	107	U	44.3	U
N-Nitrosodi-n-propylamine	621-64-7	~	~	39	U	35.8	U	45.4	U	87	U	36.1	U
N-Nitrosodimethylamine	62-75-9	~	~	54	U	49.5	U	62.8	U	120	U	50	U
N-Nitrosodiphenylamine	86-30-6	~	~	96.9	U	88.9	U	113	U	216	U	89.8	U
Naphthalene	91-20-3	12000	100000	58.7	U	53.8	U	68.3	U	131	U	54.4	U
Nitrobenzene	98-95-3	3700	15000	57.2	U	52.5	U	66.6	U	128	U	53	U
Pentachlorophenol	87-86-5	800	6700	36.6	U	33.5	U	42.5	U	81.6	U	33.9	U
Phenanthrene	85-01-8	100000	100000	370	U	339	U	430	U	825	U	342	U
Phenol	108-95-2	330	100000	56.3	U	51.6	U	65.5	U	126	U	52.1	U
Pyrene	129-00-0	100000	100000	49.5	U	45.4	U	57.6	U	111	U	45.9	U
Pyridine	110-86-1	~	~	56.1	U	51.5	U	65.3	U	125	U	52	U
bis(2-Chloroethoxy)methane	111-91-1	~	~	46.3	U	42.5	U	53.8	U	103	U	42.9	U
bis(2-Chloroethyl)ether	111-44-4	~	~	48.7	U	44.7	U	56.7	U	109	U	45.1	U
bis(2-Chloroisopropyl)ether	108-60-1	~	~	42	U	38.5	U	48.8	U	93.7	U	38.9	U
bis(2-Ethylhexyl)phthalate	117-81-7	~	~	51.1	U	46.9	U	59.5	U	114	U	47.4	U
PCBs, Pesticides, Herbicides EPA 8082/8081/8321 List		ug/kg dry	ug/kg dry	ug/kg dry									
Aroclor 1016	12674-11-2	~	~	21.5	U	19.7	U	25	U	47.9	U	19.9	U
Aroclor 1221	11104-28-2	~	~	21.5	U	19.7	U	25	U	47.9	U	19.9	U
Aroclor 1232	11141-16-5	~	~	21.5	U	19.7	U	25	U	47.9	U	19.9	U
Aroclor 1242	53469-21-9	~	~	21.5	U	19.7	U	25	U	47.9	U	19.9	U
Aroclor 1248	12672-29-6	~	~	21.5	U	19.7	U	25	U	47.9	U	19.9	U
Aroclor 1254	11097-69-1	~	~	21.5	U	19.7	U	25	U	47.9	U	19.9	U
Aroclor 1260	11096-82-5	~	~	15	U	13.7	U	17.4	U	33.4	U	13.9	U

Table 1  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix RptUnits	Compound	CASNumber	NYSDEC Part 375 Unrestricted Use (Track 1) SCOs Soil	NYSDEC Part 375 Restricted Residential Use (Track 2) SCOs Soil	SB-11A 12-15' 1304263-5 4/23/2013 Soil mg/kg dry		SB-11B 26-28' 1304263-6 4/23/2013 Soil mg/kg dry		SB-12A 12-16' 1304263-7 4/23/2013 Soil mg/kg dry		SB-12B 24-26' 1304263-8 4/23/2013 Soil mg/kg dry		SB-12C 26-28' 1304263-9 4/23/2013 Soil mg/kg dry	
					Result	Q								
Total PCBs	1336-36-3		100	1000	ND									
alpha-BHC	319-84-6		20	480	0.89	U	0.82	U	1.04	U	1.99	U	0.82	U
gamma-BHC (Lindane)	58-89-9		100	1300	1.12	U	1.03	U	1.3	U	2.5	U	1.04	U
beta-BHC	319-85-7		36	360	0.73	U	0.67	U	0.85	U	1.63	U	0.68	U
delta-BHC	319-86-8		40	100000	1.52	U	1.4	U	1.77	U	3.4	U	1.41	U
Heptachlor	76-44-8		42	2100	1.26	U	1.15	U	1.46	U	2.8	U	1.16	U
Aldrin	309-00-2		5	97	1.42	U	1.3	U	1.65	U	3.16	U	1.31	U
Heptachlor epoxide	1024-57-3		20	77	1.34	U	1.23	U	1.55	U	2.98	U	1.24	U
gamma-Chlordane	5103-74-2		540	540	1.43	U	1.31	U	1.66	U	3.19	U	1.33	U
alpha-Chlordane	5103-71-9		94	4200	1.2	U	1.1	U	1.4	U	2.68	U	1.11	U
4,4'-DDE	72-55-9		3.3	8900	1.44	U	1.32	U	1.68	U	3.22	U	1.34	U
Endosulfan I	959-98-8		2400	24000	1.38	U	1.26	U	1.6	U	3.07	U	1.27	U
Dieldrin	60-57-1		5	200	1.54	U	1.41	U	1.79	U	3.43	U	1.42	U
Endrin	72-20-8		14	11000	1.39	U	1.27	U	1.62	U	3.1	U	1.29	U
4,4'-DDD	72-54-8		3.3	13000	0.61	U	0.56	U	0.71	U	1.36	U	0.56	U
Endosulfan II	33213-65-9		2400	24000	1.09	U	1	U	1.27	U	2.44	U	1.01	U
4,4'-DDT	50-29-3		3.3	7900	0.73	U	0.67	U	0.85	U	1.63	U	0.68	U
Endosulfan sulfate	1031-07-8		2400	24000	0.97	U	0.89	U	1.13	U	2.17	U	0.9	U
Endrin Aldehyde	7421-93-4		~	~	1.01	U	0.93	U	1.18	U	2.26	U	0.94	U
Methoxychlor	72-43-5		1200	100000	1.19	U	1.09	U	1.38	U	2.65	U	1.1	U
Endrin ketone	53494-70-5		~	~	1.28	U	1.18	U	1.49	U	2.86	U	1.19	U
Toxaphene	8001-35-2		~	~	49.3	U	45.2	U	57.3	U	110	U	45.6	U
Chlordane	57-74-9		~	~	9.39	U	8.61	U	10.9	U	21	U	8.7	U
2,4-D	94-75-7		500	100000	135	U	124	U	157	U	301	U	125	U
2,4,5-T	93-76-5		1900	100000	135	U	124	U	157	U	301	U	125	U
Silvex(2,4,5-TP)	93-72-1		3800	100000	135	U	124	U	157	U	301	U	125	U
<b>Metals, Target Analyte List</b>			mg/kg dry	mg/kg dry	mg/kg dry									
Aluminum	7429-90-5		~	~	1530		4270		3900		12000		3850	
Antimony	7440-36-0		~	~	0.65	U	0.53	U	0.68	U	6.55	U	0.46	U
Arsenic	7440-38-2		13	16	2.75		0.55		23.5		4.24		0.19	
Barium	7440-39-3		350	400	85.4		33.3		152		58.3		34.9	
Beryllium	7440-41-7		7.2	72	0.072	U	0.3		0.31		0.88		0.16	
Cadmium	7440-43-9		2.5	4.3	0.29		0.024	U	0.11	U	0.29	U	0.02	U
Calcium	7440-70-2		~	~	4530		1470		20200		7890		3500	
Chromium	7440-47-3		30	180	8.09		21.7		13		21.4		18.4	
Cobalt	7440-48-4		20	30	6.73		6.13		3.83		9.14		5.76	
Copper	7440-50-8		50	270	27.7		15.8		66.4		27.4		14.1	
Iron	7439-89-6		~	~	5920		18400		6930		31100		11400	
Lead	7439-92-1		63	400	259		4.65		525		61.6		3.76	
Magnesium	7439-95-4		~	~	566		2530		700		5270		3400	
Manganese	7439-96-5		1600	2000	54.3		89.1		107		292		72.5	
Nickel	7440-02-0		30	310	10.3		9.52		7.74		22.9		9.98	
Potassium	7440-09-7		~	~	280		2180		633		2170		1480	
Selenium	7782-49-2		3.9	180	0.46	U	0.38	U	0.49	U	4.69	U	0.33	U
Silver	7440-22-4		2	180	0.048	U	0.039	U	0.05	U	0.48	U	0.034	U
Sodium	7440-23-5		~	~	93.9		124		518		269		97	
Thallium	7440-28-0		~	~	0.36	U	0.3	U	0.38	U	3.66	U	0.26	U
Vanadium	7440-62-2		~	~	15.4		24		17.2		54.2		23.9	
Zinc	7440-66-6		109	10000	124		35.8		154		61.8		25.9	
<b>Mercury by 7470/7471</b>			mg/kg dry	mg/kg dry	mg/kg dry									
Mercury	7439-97-6		0.18	0.81	2.49		0.0077		2.02		0.18		0.0076	
<b>Total Solids</b>			%	%	%		%		%		%		%	
% Solids	solids		~	~	74.1		80.8		63.7		33.2		80	
<b>GC Fingerprint - EPA 310.14</b>			mg/kg dry	mg/kg dry										
Gasoline	~		~	~	13500		NT		15700	U	NT		NT	
Lubricating Oils	~		~	~	13500		NT		15700	U	NT		NT	
Kerosene/Jet Fuel	~		~	~	13500		NT		15700	U	NT		NT	
#2 Fuel Oil/Diesel	~		~	~	13500		NT		15700	U	NT		NT	
#4 Fuel Oil	~		~	~	13500		NT		15700	U	NT		NT	
#6 Fuel Oil	~		~	~	13500		NT		15700	U	NT		NT	
Dielectric Fluid	~		~	~	13500		NT		15700	U	NT		NT	
Mineral Spirit	~		~	~	521000		NT		67800		NT		NT	

NOTES:  
**BOLD=Compound detected above the method detection limit**  
**Highlighted = Regulatory Exceedences above Unrestricted Use (Track 1) SCOs**  
**Italicized and underline = Regulatory Exceedance above Restricted Residential (Track 2) SCOs**  
 ND=Not Detected  
 NT=this indicates the analyte was not a target for this sample  
 Q is the Qualifier Column with definitions as follows:  
 U=analyte not detected at or above the level indicated  
 B=analyte found in the analysis batch blank  
 J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated  
 D=result is from an analysis that required a dilution  
 E=result is estimated and cannot be accurately reported due to levels encountered or interferences  
 ~this indicates that no regulatory limit has been established for this analyte

Table 2  
Groundwater Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix RptUnits	CASNumber	NYSDEC TOGS Standards and Guidance Values - GA Water ug/L	TWP-01 1304264-3 4/23/2013 Water ug/L		TWP-02 1304264-1 4/22/2013 Water ug/L		TWP-03 1304264-2 4/22/2013 Water ug/L	
			Result	Q	Result	Q	Result	Q
<b>Volatile Organics, TCL (Target Compound List)</b>		ug/L	ug/L		ug/L		ug/L	
Acetone	67-64-1	50	1.18	U	1.18	U	1.18	U
Carbon Tetrachloride	56-23-5	5	0.28	U	0.28	U	0.28	U
Chloroform	67-66-3	7	0.31	U	0.31	U	0.31	U
Benzene	71-43-2	1	0.3	U	0.3	U	0.3	U
1,1,1-Trichloroethane	71-55-6	5	0.34	U	0.34	U	0.34	U
Bromomethane	74-83-9	~	0.34	U	0.34	U	0.34	U
Chloromethane	74-87-3	5	0.5	U	0.5	U	0.5	U
Dibromomethane	74-95-3	5	0.37	U	0.37	U	0.37	U
Bromochloromethane	74-97-5	50	0.28	U	0.28	U	0.28	U
Chloroethane	75-00-3	5	0.86	U	0.86	U	0.86	U
Vinyl Chloride	75-01-4	2	0.71	U	0.71	U	0.71	U
Methylene Chloride	75-09-2	5	0.23	U	0.23	U	0.23	U
Carbon disulfide	75-15-0	~	0.34	U	0.34	U	0.34	U
Bromoform	75-25-2	50	0.22	U	0.22	U	0.22	U
Bromodichloromethane	75-27-4	~	0.23	U	0.23	U	0.23	U
1,1-Dichloroethane	75-34-3	5	0.27	U	0.27	U	0.27	U
1,1-Dichloroethene	75-35-4	5	0.28	U	0.28	U	0.28	U
Tertiary butyl alcohol	75-65-0	~	5.68	U	5.68	U	5.68	U
Trichlorofluoromethane	75-69-4	5	0.38	U	0.38	U	0.38	U
Dichlorodifluoromethane	75-71-8	5	0.37	U	0.37	U	0.37	U
1,1,2-Trichlorotrifluoroethane	76-13-1	5	0.58	U	0.58	U	0.58	U
1,2-Dichloropropane	78-87-5	1	0.36	U	0.36	U	0.36	U
2-Butanone	78-93-3	50	1.37	U	1.37	U	1.37	U
1,1,2-Trichloroethane	79-00-5	1	0.28	U	0.28	U	0.28	U
Trichloroethene	79-01-6	5	0.18	U	0.18	U	0.18	U
1,1,2,2-Tetrachloroethane	79-34-5	5	0.25	U	0.25	U	0.25	U
1,2,3-Trichlorobenzene	87-61-6	5	0.38	U	0.38	U	0.38	U
Hexachlorobutadiene	87-68-3	0.5	0.32	U	0.32	U	0.32	U
Naphthalene	91-20-3	10	0.12	U	0.12	U	1.19	U
o-xylene	95-47-6	5	0.32	U	0.32	U	0.32	U
2-Chlorotoluene	95-49-8	5	0.26	U	0.26	U	0.26	U
1,2-Dichlorobenzene	95-50-1	3	0.15	U	0.15	U	0.15	U
1,2,4-Trimethylbenzene	95-63-6	5	0.23	U	1.85	J	7.78	
1,2,4,5-Tetramethylbenzene	95-93-2	5	90.9		135		49.5	
1,2-Dibromo-3-chloropropane	96-12-8	0.04	0.55	U	0.55	U	0.55	U
1,2,3-Trichloropropane	96-18-4	0.04	0.21	U	0.21	U	0.21	U
tert-Butylbenzene	98-82-8	5	43.5		43.7		19.8	
Isopropylbenzene	98-82-8	5	33.7		9.2		70.7	
4-Isopropyltoluene	99-87-6	5	4.92	J	0.29	U	5.02	
Ethylbenzene	100-41-4	5	0.27	U	0.27	U	0.27	U
Styrene	100-42-5	5	0.2	U	0.2	U	0.2	U
n-Propylbenzene	103-65-1	5	8.99		0.25	U	121	
n-Butylbenzene	104-51-8	5	63.4		31.4		42	
p-Diethylbenzene	105-05-5	~	0.25	U	42.7		0.25	U
4-Chlorotoluene	106-43-4	5	0.26	U	0.26	U	0.26	U
1,4-Dichlorobenzene	106-46-7	3	0.27	U	0.27	U	0.27	U
1,2-Dibromoethane	106-93-4	5	0.23	U	0.23	U	0.23	U
1,2-Dichloroethane	107-06-2	0.6	0.3	U	0.3	U	0.3	U
Acrylonitrile	107-13-1	5	1.97	U	1.97	U	1.97	U
4-Methyl-2-pentanone	108-10-1	~	3.94	U	3.94	U	3.94	U
m,p-xylene	1330-20-7P/M	5	0.74	U	0.74	U	0.82	J
1,3,5-Trimethylbenzene	108-67-8	5	0.2	U	0.2	U	2.97	J
Bromobenzene	108-86-1	5	0.28	U	0.28	U	0.28	U
Toluene	108-88-3	5	1.57	J	0.6		0.34	U
Chlorobenzene	108-90-7	5	0.24	U	0.24	U	0.24	U
2-Chloroethylvinylether	110-75-8	~	1.15	U	1.15	U	1.15	U
1,2,4-Trichlorobenzene	120-82-1	5	0.23	U	0.23	U	0.23	U
Dibromochloromethane	124-48-1	50	0.21	U	0.21	U	0.21	U
Tetrachloroethene	127-18-4	5	0.46	U	0.46	U	0.46	U
sec-Butylbenzene	135-98-8	5	160		92.2		90	
1,3-Dichloropropane	142-28-9	5	0.39	U	0.39	U	0.39	U
c-1,2-Dichloroethene	156-59-2	5	0.24	U	0.24	U	0.24	U
t-1,2-Dichloroethene	156-60-5	~	0.42	U	0.42	U	0.42	U
1,3-Dichlorobenzene	541-73-1	20	0.26	U	0.26	U	0.26	U
1,1-Dichloropropene	563-58-6	5	0.47	U	0.47	U	0.47	U
2,2-Dichloropropane	590-20-7	5	0.35	U	0.35	U	0.35	U
2-Hexanone	591-78-6	50	2.54	U	2.54	U	2.54	U
p-Ethyltoluene	622-96-8	~	0.31	U	0.31	U	2.94	J
1,1,1,2-Tetrachloroethane	630-20-6	5	0.22	U	0.22	U	0.22	U
TAME	994-05-08	~	0.27	U	0.27	U	0.27	U
Methyl t-butyl ether	1634-04-4	10	0.17	U	0.17	U	3.39	J
c-1,3-Dichloropropene	10061-01-5	0.4	0.33	U	0.33	U	0.33	U
t-1,3-Dichloropropene	10061-02-6	0.4	0.26	U	0.26	U	0.26	U
<b>Semi-Volatiles, EPA TCL List</b>		ug/L	ug/L		ug/L		ug/L	
1,2,4-Trichlorobenzene	120-82-1	5	0.64	U	0.64	U	0.64	U
1,2-Dichlorobenzene	95-50-1	3	0.65	U	0.65	U	0.65	U
1,2-Diphenylhydrazine	122-66-7	0.05	1.02	U	1.02	U	1.02	U
1,3-Dichlorobenzene	541-73-1	3	0.68	U	0.68	U	0.68	U
1,4-Dichlorobenzene	106-46-7	3	0.73	U	0.73	U	0.73	U
2,3,4,6-Tetrachlorophenol	58-90-2	~	0.72	U	0.72	U	0.72	U
2,4,5-Trichlorophenol	95-95-4	1	0.52	U	0.52	U	0.52	U
2,4,6-Trichlorophenol	88-06-2	1	0.84	U	0.84	U	0.84	U
2,4-Dichlorophenol	120-83-2	5	0.72	U	0.72	U	0.72	U
2,4-Dimethylphenol	105-67-9	50	0.9	U	0.9	U	0.9	U
2,4-Dinitrophenol	51-28-5	10	1.61	U	1.61	U	1.61	U
2,4-Dinitrotoluene	121-14-2	5	0.75	U	0.75	U	0.75	U
2,6-Dinitrotoluene	606-20-2	5	0.99	U	0.99	U	0.99	U
2-Chloronaphthalene	91-58-7	10	0.8	U	0.8	U	0.8	U
2-Chlorophenol	95-57-8	1	0.64	U	0.64	U	0.64	U
2-Methylnaphthalene	91-57-6	~	0.74	U	0.74	U	0.74	U
2-Methylphenol	95-48-7	1	0.46	U	0.46	U	0.46	U
2-Nitroaniline	88-74-4	5	0.49	U	0.49	U	0.49	U
2-Nitrophenol	88-75-5	1	0.62	U	0.62	U	0.62	U
3+4-Methylphenol	100-01-6	5	0.31	U	0.31	U	0.31	U
3,3'-Dichlorobenzidine	91-94-1	~	1.33	U	1.33	U	1.33	U
3-Nitroaniline	99-09-2	5	0.34	U	0.34	U	0.34	U
4,6-Dinitro-2-methylphenol	534-52-1	~	0.47	U	0.47	U	0.47	U
4-Bromophenyl phenyl ether	101-55-3	~	1.01	U	1.01	U	1.01	U
4-Chloro-3-methylphenol	59-50-7	1	0.73	U	0.73	U	0.73	U
4-Chloroaniline	106-47-8	5	0.42	U	0.42	U	0.42	U
4-Chlorophenyl phenyl ether	7005-72-3	~	0.86	U	0.86	U	0.86	U

Table 2  
Groundwater Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix RptUnits	CASNumber	NYSDEC TOGS Standards and Guidance Values - GA Water ug/L	TWP-01 1304264-3 4/23/2013 Water ug/L		TWP-02 1304264-1 4/22/2013 Water ug/L		TWP-03 1304264-2 4/22/2013 Water ug/L	
			Result	Q	Result	Q	Result	Q
4-Nitroaniline	100-02-7	5	0.52	U	0.52	U	0.52	U
4-Nitrophenol	56-57-5	1	1.61	U	1.61	U	1.61	U
Acenaphthene	83-32-9	20	0.77	U	0.77	U	0.77	U
Acenaphthylene	208-96-8	~	0.74	U	0.74	U	0.74	U
Aniline	62-53-3	5	0.46	U	0.46	U	0.46	U
Anthracene	120-12-7	50	0.88	U	0.88	U	0.88	U
Benzidine	92-87-5	5	48.2	U	48.2	U	48.2	U
Benzo(a)anthracene	56-55-3	0.002	0.96	U	0.96	U	0.96	U
Benzo(a)pyrene	50-32-8	0.002	0.82	U	0.82	U	0.82	U
Benzo(b)fluoranthene	205-99-2	0.002	0.85	U	0.85	U	0.85	U
Benzo(g,h,i)perylene	191-24-2	~	0.85	U	0.85	U	0.85	U
Benzo(k)fluoranthene	207-08-9	0.002	1	U	1	U	1	U
Benzoic acid	65-85-0	~	10	U	10	U	10	U
Benzyl alcohol	100-51-6	~	0.41	U	0.41	U	0.41	U
Butyl benzyl phthalate	85-68-7	50	1.06	U	1.06	U	1.06	U
Carbazole	86-74-8	~	1.99	U	1.99	U	1.99	U
Chrysene	218-01-9	0.002	1	U	1	U	1	U
Cresols	~	~	0.77	U	0.77	U	0.77	U
Di-n-butyl phthalate	84-74-2	50	1.08	U	1.08	U	1.08	U
Di-n-octyl phthalate	117-84-0	50	1.28	U	1.28	U	1.28	U
Dibenz(a,h)anthracene	53-70-3	~	1	U	1	U	1	U
Dibenzofuran	132-64-9	~	0.62	U	0.62	U	0.62	U
Diethyl phthalate	84-66-2	50	1	U	1	U	1	U
Dimethyl phthalate	131-11-3	50	0.78	U	0.78	U	0.78	U
Fluoranthene	206-44-0	50	0.96	U	0.96	U	0.96	U
Fluorene	86-73-7	50	0.82	U	0.82	U	0.82	U
Hexachlorobenzene	118-74-1	0.04	0.86	U	0.86	U	0.86	U
Hexachlorobutadiene	87-68-3	0.5	0.78	U	0.78	U	0.78	U
Hexachlorocyclopentadiene	77-47-4	5	0.21	U	0.21	U	0.21	U
Hexachloroethane	67-72-1	5	0.69	U	0.69	U	0.69	U
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	0.9	U	0.9	U	0.9	U
Isophorone	78-59-1	50	0.69	U	0.69	U	0.69	U
N-Nitrosodi-n-propylamine	621-64-7	~	0.57	U	0.57	U	0.57	U
N-Nitrosodimethylamine	62-75-9	~	0.24	U	0.24	U	0.24	U
N-Nitrosodiphenylamine	86-30-6	50	1.09	U	1.09	U	1.09	U
Naphthalene	91-20-3	10	0.78	U	0.78	U	0.78	U
Nitrobenzene	98-95-3	0.4	0.71	U	0.71	U	0.71	U
Pentachlorophenol	87-86-5	1	0.65	U	0.65	U	0.65	U
Phenanthrene	85-01-8	50	0.95	U	0.95	U	0.95	U
Phenol	108-95-2	1	0.33	U	0.33	U	0.33	U
Pyrene	129-00-0	50	0.85	U	0.85	U	0.85	U
Pyridine	110-86-1	50	0.37	U	0.37	U	0.37	U
bis(2-Chloroethoxy)methane	111-91-1	5	0.7	U	0.7	U	0.7	U
bis(2-Chloroethyl)ether	111-44-4	1	0.57	U	0.57	U	0.57	U
bis(2-Chloroisopropyl)ether	108-60-1	5	0.74	U	0.74	U	0.74	U
bis(2-Ethylhexyl)phthalate	117-81-7	5	1.26	U	1.26	U	1.26	U
<b>PCBs, Pesticides, Herbicides EPA 8082/8081/8321 List</b>								
Aroclor 1016	12674-11-2	~	0.074	U	0.074	U	0.074	U
Aroclor 1221	11104-28-2	~	0.09	U	0.09	U	0.09	U
Aroclor 1232	11141-16-5	~	0.09	U	0.09	U	0.09	U
Aroclor 1242	53469-21-9	~	0.09	U	0.09	U	0.09	U
Aroclor 1248	12672-29-6	~	0.09	U	0.09	U	0.09	U
Aroclor 1254	11097-69-1	~	0.09	U	0.09	U	0.09	U
Aroclor 1260	11096-82-5	~	0.1	U	0.1	U	0.1	U
Total PCBs	1336-36-3	~	ND		ND		ND	
alpha-BHC	319-84-6	0.01	0.00092	U	0.00092	U	0.00092	U
gamma-BHC (Lindane)	58-89-9	0.05	0.00089	U	0.00089	U	0.00089	U
beta-BHC	319-85-7	0.04	0.0015	U	0.0015	U	0.0015	U
delta-BHC	319-86-8	0.04	0.0013	U	0.0013	U	0.0013	U
Heptachlor	76-44-8	0.04	0.0012	U	0.0012	U	0.0012	U
Aldrin	309-00-2	0.002	0.0011	U	0.0011	U	0.0011	U
Heptachlor epoxide	1024-57-3	0.03	0.0013	U	0.0013	U	0.0013	U
gamma-Chlordane	5103-74-2	~	0.0013	U	0.0013	U	0.0013	U
alpha-Chlordane	5103-71-9	~	0.0012	U	0.0012	U	0.0012	U
4,4'-DDE	72-55-9	0.2	0.0015	U	0.0015	U	0.0015	U
Endosulfan I	959-98-8	~	0.0013	U	0.0013	U	0.0013	U
Dieldrin	60-57-1	0.004	0.0011	U	0.0011	U	0.0011	U
Endrin	72-20-8	0.002	0.0014	U	0.0014	U	0.0014	U
4,4'-DDD	72-54-8	0.3	0.0013	U	0.0013	U	0.0013	U
Endosulfan II	33213-65-9	~	0.0015	U	0.0015	U	0.0015	U
4,4'-DDT	50-29-3	0.2	0.0014	U	0.0014	U	0.0014	U
Endosulfan sulfate	1031-07-8	~	0.0014	U	0.0014	U	0.0014	U
Endrin Aldehyde	7421-93-4	5	0.001	U	0.001	U	0.001	U
Methoxychlor	72-43-5	35	0.0014	U	0.0014	U	0.0014	U
Endrin ketone	53494-70-5	5	0.0014	U	0.0014	U	0.0014	U
Toxaphene	8001-35-2	0.06	0.39	U	0.39	U	0.39	U
Chlordane	57-74-9	0.05	0.12	U	0.12	U	0.12	U
2,4-D	94-75-7	50	13.5	U	13.5	U	13.5	U
2,4,5-T	93-76-5	35	20.5	U	20.5	U	20.5	U
Silvex(2,4,5-TP)	93-72-1	0.26	20.5	U	20.5	U	20.5	U
<b>Metals, Dissolved - Target Analyte (TAL)</b>								
Aluminum	7429-90-5	mg/L	0.86		0.25		0.025	U
Antimony	7440-36-0	~	0.009		0.009	U	0.009	U
Arsenic	7440-38-2	0.025	0.025		0.0038	U	0.0038	U
Barium	7440-39-3	1	0.47		0.28		0.35	
Beryllium	7440-41-7	~	0.001	U	0.001	U	0.001	U
Cadmium	7440-43-9	0.005	0.0006		0.0004	U	0.0004	U
Calcium	7440-70-2	~	157		215		148	
Chromium	7440-47-3	0.05	0.032		0.0037		0.0055	
Cobalt	7440-48-4	~	0.0044		0.00074	U	0.0024	
Copper	7440-50-8	0.2	0.018		0.005		0.0034	U
Iron	7439-89-6	~	3.87		2.28		16.7	
Lead	7439-92-1	0.025	0.13		0.036		0.024	
Magnesium	7439-95-4	35	17.4		26.9		17.4	
Manganese	7439-96-5	~	1.04		1.96		0.6	
Nickel	7440-02-0	~	0.036		0.0041		0.006	
Potassium	7440-09-7	~	12.4		19.6		21.1	
Selenium	7782-49-2	0.01	0.0064	U	0.0064	U	0.0064	U
Silver	7440-22-4	0.05	0.00066	U	0.00066	U	0.00066	U
Sodium	7440-23-5	~	45.3		70.5		78	
Thallium	7440-28-0	~	0.005	U	0.005	U	0.005	U
Vanadium	7440-62-2	~	0.00067	U	0.00067	U	0.00067	U

Table 2  
Groundwater Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix RptUnits		NYSDEC TOGS Standards and Guidance Values - GA Water ug/L	TWP-01 1304264-3 4/23/2013 Water ug/L	TWP-02 1304264-1 4/22/2013 Water ug/L	TWP-03 1304264-2 4/22/2013 Water ug/L
Compound	CASNumber		Result	Result	Result
Zinc	7440-66-6	~	0.23	0.024	0.016
<b>Metals, Target Analyte</b>		ug/L	mg/L	mg/L	mg/L
Aluminum	7429-90-5	~	0.2	1.12	1.53
Antimony	7440-36-0	~	0.009 U	0.009 U	0.009 U
Arsenic	7440-38-2	0.025	0.027	0.0038 U	0.0038 U
Barium	7440-39-3	1	0.4	0.34 U	0.5
Beryllium	7440-41-7	~	0.001 U	0.001 U	0.001 U
Cadmium	7440-43-9	0.005	0.0004 U	0.0004 U	0.0004 U
Calcium	7440-70-2	~	165	254	206
Chromium	7440-47-3	0.05	0.027	0.018	0.035
Cobalt	7440-48-4	~	0.0038	0.00074 U	0.001
Copper	7440-50-8	0.2	0.0091	0.024	0.0034 U
Iron	7439-89-6	~	3.72	2.54	25.7
Lead	7439-92-1	0.025	0.14	0.049	0.086
Magnesium	7439-95-4	35	17.6	29.3	23.7
Manganese	7439-96-5	~	1.21	2.18	0.82
Nickel	7440-02-0	~	0.014	0.019	0.064
Potassium	7440-09-7	~	12.6	23.8	30.4
Selenium	7782-49-2	0.01	0.0064 U	0.0064 U	0.0064 U
Silver	7440-22-4	0.05	0.00066 U	0.00066 U	0.00066 U
Sodium	7440-23-5	~	46.3	81.4	107
Thallium	7440-28-0	~	0.005 U	0.005 U	0.005 U
Vanadium	7440-62-2	~	0.00067 U	0.00067 U	0.00067 U
Zinc	7440-66-6	~	0.092	0.12	0.49
<b>Mercury by 7470/7471</b>		mg/L	mg/L	mg/L	mg/L
Mercury	7439-97-6	0.0007	0.0031	0.00044	0.00054
<b>Mercury, Dissolved</b>		mg/L	mg/L	mg/L	mg/L
Mercury	7439-97-6	0.0007	0.0016	0.00038	0.00058
<b>GC Fingerprint - EPA 310.14</b>		mg/L	mg/L	mg/L	mg/L
Gasoline		~	0.1 U	0.1 U	0.1 U
Lubricating Oils		~	0.1 U	0.1 U	0.1 U
Kerosene/Jet Fuel		~	0.1 U	0.1 U	0.1 U
#2 Fuel Oil/Diesel		~	0.1 U	0.1 U	0.1 U
#4 Fuel Oil		~	0.1 U	0.1 U	0.1 U
#6 Fuel Oil		~	0.1 U	0.1 U	0.1 U
Dielectric Fluid		~	0.1 U	0.1 U	0.1 U
Mineral Spirit		~	0.1 U	0.1 U	0.1 U

NOTES:

**BOLD=Compound detected above the method detection limit**

Any Regulatory Exceedences are color coded by Regulator

ND=Not Detected

U=analyte not detected at or above the level indicated

B=analyte found in the analysis batch blank

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

D=result is from an analysis that required a dilutor

E=result is estimated and cannot be accurately reported due to levels encountered or interference

NT=this indicates the analyte was not a target for this sample

~=this indicates that no regulatory limit has been established for this analyte

Table 3  
Soil Vapor Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date DilutionFactor ClientMatrix RptUnits		DOH Guidance Levels 2006	Y63/SV-01 13D0913-01 4/24/2013 19.16 Soil Vapor ug/m <sup>3</sup>		Y73/SV-02 13D0913-02 4/24/2013 72 Soil Vapor ug/m <sup>3</sup>		Y26/SV-03 13D0913-03 4/24/2013 28.31 Soil Vapor ug/m <sup>3</sup>	
Compound	CASNumber		Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List			ug/m <sup>3</sup>		ug/m <sup>3</sup>		ug/m <sup>3</sup>	
1,1,1-Trichloroethane	71-55-6	<b>DOH Matrix 2</b> < 100 100 - 1,000 1,000 and above	11 NFA / Reasonable Action	U	40 NFA / Reasonable Action	U	16 NFA / Reasonable Action	U
1,1,2,2-Tetrachloroethane	79-34-5	~	13	U	50	U	20	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	~	15	U	56	U	22	U
1,1,2-Trichloroethane	79-00-5	~	11	U	40	U	16	U
1,1-Dichloroethane	75-34-3	~	7.9	U	30	U	12	U
1,1-Dichloroethylene	75-35-4	~	7.7	U	29	U	11	U
1,2,4-Trichlorobenzene	120-82-1	~	14	U	54	U	21	U
1,2,4-Trimethylbenzene	95-63-6	~	<b>110</b>	<b>D</b>	36	U	<b>75</b>	<b>D</b>
1,2-Dibromoethane	106-93-4	~	15	U	56	U	22	U
1,2-Dichlorobenzene	95-50-1	~	12	U	44	U	17	U
1,2-Dichloroethane	107-06-2	~	7.9	U	30	U	12	U
1,2-Dichloropropane	78-87-5	~	9.0	U	34	U	13	U
1,2-Dichlorotetrafluoroethane	76-14-2	~	14	U	51	U	20	U
1,3,5-Trimethylbenzene	108-67-8	~	<b>37</b>	<b>D</b>	36	U	<b>21</b>	<b>D</b>
1,3-Butadiene	106-99-0	~	8.4	U	32	U	12	U
1,3-Dichlorobenzene	541-73-1	~	12	U	44	U	17	U
1,4-Dichlorobenzene	106-46-7	~	12	U	44	U	17	U
1,4-Dioxane	123-91-1	~	7.0	U	26	U	10	U
2-Butanone	78-93-3	~	<b>95</b>	<b>D</b>	22	U	8.5	U
2-Hexanone	591-78-6	~	8.0	U	30	U	12	U
4-Methyl-2-pentanone	108-10-1	~	8.0	U	30	U	12	U
Acetone	67-64-1	~	<b>220</b>	<b>D</b>	<b>57</b>	<b>D</b>	<b>21</b>	<b>D</b>
Benzene	71-43-2	~	6.2	U	23	U	9.2	U
Benzyl chloride	100-44-7	~	10	U	38	U	15	U
Bromodichloromethane	75-27-4	~	12	U	45	U	18	U
Bromoform	75-25-2	~	20	U	76	U	30	U
Bromomethane	74-83-9	~	7.6	U	28	U	11	U
Carbon disulfide	75-15-0	~	<b>75</b>	<b>D</b>	<b>100</b>	<b>D</b>	9.0	U
Carbon tetrachloride	56-23-5	<b>DOH Matrix 1</b> < 5 5 - 50 50 - 250 250 and above	6.1 NFA / Reasonable Action	U	23 NFA / Reasonable Action	U	9.1 NFA / Reasonable Action	U
Chlorobenzene	108-90-7	~	9.0	U	<b>47</b>	<b>D</b>	13	U
Chloroethane	75-00-3	~	5.1	U	19	U	7.6	U
Chloroform	67-66-3	~	9.5	U	36	U	14	U
Chloromethane	74-87-3	~	4.0	U	15	U	5.9	U
cis-1,2-Dichloroethylene	156-59-2	~	<b>29</b>	<b>D</b>	29	U	11	U
cis-1,3-Dichloropropylene	10061-01-5	~	8.8	U	33	U	13	U
Cyclohexane	110-82-7	~	<b>1100</b>	<b>D</b>	<b>78</b>	<b>D</b>	<b>12</b>	<b>D</b>
Dibromochloromethane	124-48-1	~	16	U	59	U	23	U
Dichlorodifluoromethane	75-71-8	~	9.6	U	36	U	14	U
Ethyl acetate	141-78-6	~	7.0	U	26	U	10	U
Ethyl Benzene	100-41-4	~	88	<b>D</b>	32	U	<b>43</b>	<b>D</b>
Hexachlorobutadiene	87-68-3	~	21	U	78	U	31	U
Isopropanol	67-63-0	~	<b>350</b>	<b>D</b>	18	U	7.1	U
Methyl Methacrylate	80-62-6	~	8.0	U	30	U	12	U
Methyl tert-butyl ether (MTBE)	1634-04-4	~	7.0	U	26	U	10	U
Methylene chloride	75-09-2	~	6.8	U	<b>43</b>	<b>D</b>	<b>13</b>	<b>D</b>
n-Heptane	142-82-5	~	8.0	U	30	U	<b>17</b>	<b>D</b>
n-Hexane	110-54-3	~	<b>100</b>	<b>D</b>	26	U	<b>11</b>	<b>D</b>
o-Xylene	95-47-6	~	<b>96</b>	<b>D</b>	32	U	<b>59</b>	<b>D</b>
p- & m- Xylenes	179601-23-1	~	<b>380</b>	<b>D</b>	<b>67</b>	<b>D</b>	<b>160</b>	<b>D</b>
p-Ethyltoluene	622-96-8	~	<b>120</b>	<b>D</b>	180	U	<b>82</b>	<b>D</b>
Propylene	115-07-01	~	3.4	U	13	U	5.0	U
Styrene	100-42-5	~	8.3	U	31	U	12	U
Tetrachloroethylene	127-18-4	<b>DOH Matrix 2</b> < 100 100 - 1,000 1,000 and above	<b>20</b> NFA / Reasonable Action	<b>D</b>	50 NFA / Reasonable Action	U	20 NFA / Reasonable Action	U
Tetrahydrofuran	109-99-9	~	5.7	U	22	U	8.5	U
Toluene	108-88-3	~	<b>200</b>	<b>D</b>	<b>44</b>	<b>D</b>	<b>90</b>	<b>D</b>
trans-1,2-Dichloroethylene	156-60-5	~	<b>12</b>	<b>D</b>	29	U	11	U
trans-1,3-Dichloropropylene	10061-02-6	~	8.8	U	33	U	13	U
Trichloroethylene	79-01-6	<b>DOH Matrix 1</b> < 5 5 - 50 50 - 250 250 and above	5.2 NFA / Reasonable Action	U	20 NFA / Reasonable Action	U	7.7 NFA / Reasonable Action	U
Trichlorofluoromethane (Freon 11)	75-69-4		11	U	41	U	16	U
Vinyl acetate	108-05-4		6.9	U	26	U	10	U
Vinyl Chloride	75-01-4		5.0	U	19	U	7.4	U

NOTES:

**BOLD=Compound detected above the method detection limit**

Any Regulatory Exceedences are color coded by Regulator

NFA=No Further Action

Q is the Qualifier Column with definitions as follows

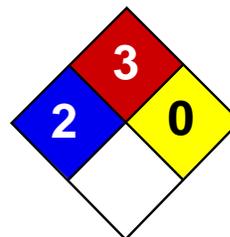
D=result is from an analysis that required a dilutor

U=analyte not detected at or above the level indicated

~=this indicates that no regulatory limit has been established for this analyte

## **APPENDICES**

### **Appendix A**    MSDS Sheets



Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Benzene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Benzene

**Catalog Codes:** SLB1564, SLB3055, SLB2881

**CAS#:** 71-43-2

**RTECS:** CY1400000

**TSCA:** TSCA 8(b) inventory: Benzene

**CI#:** Not available.

**Synonym:** Benzol; Benzine

**Chemical Name:** Benzene

**Chemical Formula:** C6-H6

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

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

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

Order Online: [ScienceLab.com](http://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, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:**

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

**Explosion Hazards in Presence of Various Substances:**

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

**Fire Fighting Media and Instructions:**

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

**Special Remarks on Fire Hazards:**

Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Vigorous 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, dimanganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

## 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/m<sup>3</sup>) 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/m<sup>3</sup>) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m<sup>3</sup>) [Canada] TWA: 0.5 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:**

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

**Taste:** Not available.

**Molecular Weight:** 78.11 g/mole

**Color:** Clear Colorless. Colorless to light yellow.

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

**Boiling Point:** 80.1 (176.2°F)

**Melting Point:** 5.5°C (41.9°F)

**Critical Temperature:** 288.9°C (552°F)

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

**Vapor Pressure:** 10 kPa (@ 20°C)

**Vapor Density:** 2.8 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 4.68 ppm

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

**Ionicity (in Water):** Not available.

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

**Solubility:**

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, incompatibles.

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

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

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

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

**Chronic Effects on Humans:**

**CARCINOGENIC EFFECTS:** Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. **MUTAGENIC EFFECTS:** Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **DEVELOPMENTAL TOXICITY:** Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia) Human: passes the placental barrier, detected in maternal milk.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

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

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

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

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

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification:** : Benzene UNNA: 1114 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

**Other Regulations:**

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

**Other Classifications:**

**WHMIS (Canada):**

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

**DSCL (EEC):**

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

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

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

**Section 16: Other Information**

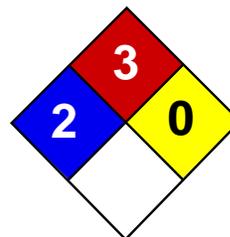
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:35 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## 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:** C<sub>8</sub>H<sub>10</sub>

**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](http://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/m<sup>3</sup>) 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;  $\log(\text{oil/water}) = 3.1$

**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, ignition 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 consciousness, 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 gastrointestinal/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:**

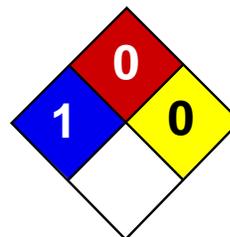
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:28 PM

**Last Updated:** 05/21/2013 12:00 PM

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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](http://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/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 0.03 (mg/m<sup>3</sup>) from NIOSH [United States] TWA: 0.05 (mg/m<sup>3</sup>) [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 lungs by 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 absorbed 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, delirium, 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 colic), 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

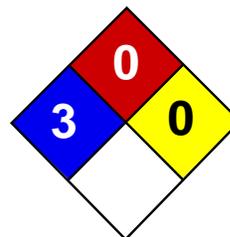
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:21 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	3
Fire	0
Reactivity	0
Personal Protection	

## Material Safety Data Sheet Mercury MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Mercury

**Catalog Codes:** SLM3505, SLM1363

**CAS#:** 7439-97-6

**RTECS:** OV4550000

**TSCA:** TSCA 8(b) inventory: Mercury

**CI#:** Not applicable.

**Synonym:** Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragyrum

**Chemical Name:** Mercury

**Chemical Formula:** Hg

**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](http://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
Mercury	7439-97-6	100

**Toxicological Data on Ingredients:** Mercury LD50: Not available. LC50: Not available.

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

**Potential Chronic Health Effects:**

Hazardous in case of skin contact (permeator). **CARCINOGENIC EFFECTS:** Classified A5 (Not suspected for human.) 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, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

## Section 4: First Aid Measures

### **Eye Contact:**

Check for and remove any contact lenses. 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 for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

### **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 immediately.

### **Serious Inhalation:**

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

### **Ingestion:**

Do NOT induce vomiting 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:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

### **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:** Not applicable.

### **Special Remarks on Fire Hazards:**

When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

### **Special Remarks on Explosion Hazards:**

A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

## Section 6: Accidental Release Measures

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

**Large Spill:**

Corrosive liquid. Poisonous liquid. 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. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. 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 locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. 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, metals.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

## 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:**

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

**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: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m<sup>3</sup>) from OSHA (PEL) [United States]  
Inhalation TWA: 0.025 (mg/m<sup>3</sup>) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Heavy liquid)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 200.59 g/mole

**Color:** Silver-white

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

**Boiling Point:** 356.73°C (674.1°F)

**Melting Point:** -38.87°C (-38°F)

**Critical Temperature:** 1462°C (2663.6°F)

**Specific Gravity:** 13.55 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 6.93 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Very slightly soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, metals.

**Corrosivity:** Non-corrosive in presence of glass.

### Special Remarks on Reactivity:

Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonylnickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsilane, calcium,

### Special Remarks on Corrosivity:

The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalgam) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

### Toxicity to Animals:

LD50: Not available. LC50: Not available.

### Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

### Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

**Special Remarks on other Toxic Effects on Humans:**

### 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 8: Corrosive material

**Identification:** : Mercury UNNA: 2809 PG: III

**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: Mercury 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: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 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 D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

**DSCL (EEC):**

R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:**

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

**Health:** 3

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

## Section 16: Other Information

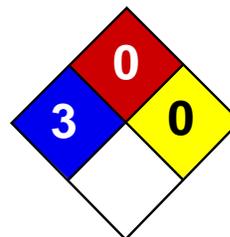
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:22 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	3
Fire	0
Reactivity	0
Personal Protection	

## Material Safety Data Sheet Mercury MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Mercury

**Catalog Codes:** SLM3505, SLM1363

**CAS#:** 7439-97-6

**RTECS:** OV4550000

**TSCA:** TSCA 8(b) inventory: Mercury

**CI#:** Not applicable.

**Synonym:** Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragryum

**Chemical Name:** Mercury

**Chemical Formula:** Hg

**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](http://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
Mercury	7439-97-6	100

**Toxicological Data on Ingredients:** Mercury LD50: Not available. LC50: Not available.

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

**Potential Chronic Health Effects:**

Hazardous in case of skin contact (permeator). **CARCINOGENIC EFFECTS:** Classified A5 (Not suspected for human.) 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, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

## Section 4: First Aid Measures

### **Eye Contact:**

Check for and remove any contact lenses. 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 for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

### **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 immediately.

### **Serious Inhalation:**

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

### **Ingestion:**

Do NOT induce vomiting 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:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

### **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:** Not applicable.

### **Special Remarks on Fire Hazards:**

When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

### **Special Remarks on Explosion Hazards:**

A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

## Section 6: Accidental Release Measures

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

**Large Spill:**

Corrosive liquid. Poisonous liquid. 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. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. 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 locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. 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, metals.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

## 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:**

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

**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: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m<sup>3</sup>) from OSHA (PEL) [United States]  
Inhalation TWA: 0.025 (mg/m<sup>3</sup>) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Heavy liquid)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 200.59 g/mole

**Color:** Silver-white

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

**Boiling Point:** 356.73°C (674.1°F)

**Melting Point:** -38.87°C (-38°F)

**Critical Temperature:** 1462°C (2663.6°F)

**Specific Gravity:** 13.55 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 6.93 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Very slightly soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, metals.

**Corrosivity:** Non-corrosive in presence of glass.

### Special Remarks on Reactivity:

Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonylnickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsilane, calcium,

### Special Remarks on Corrosivity:

The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalgam) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

### Toxicity to Animals:

LD50: Not available. LC50: Not available.

### Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

### Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

**Special Remarks on other Toxic Effects on Humans:**

### 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 8: Corrosive material

**Identification:** : Mercury UNNA: 2809 PG: III

**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: Mercury 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: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 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 D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

**DSCL (EEC):**

R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:**

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

**Health:** 3

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:22 PM

**Last Updated:** 05/21/2013 12:00 PM

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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](http://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:**

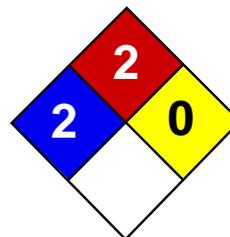
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérigènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Industrial 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 dangereuses au Canada. Centre de conformité international Ltée. 1986.

**Other Special Considerations:** Not available.

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Health	2
Fire	2
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet Naphthalene MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Naphthalene

**Catalog Codes:** SLN1789, SLN2401

**CAS#:** 91-20-3

**RTECS:** QJ0525000

**TSCA:** TSCA 8(b) inventory: Naphthalene

**CI#:** Not available.

**Synonym:**

**Chemical Name:** Not available.

**Chemical Formula:** C<sub>10</sub>H<sub>8</sub>

**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](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

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

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

### Section 2: Composition and Information on Ingredients

**Composition:**

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

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

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

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

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

### Section 4: First Aid Measures

**Eye Contact:**

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

**Skin Contact:**

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

**Serious Skin Contact:** Not available.

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

**Serious Inhalation:**

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

**Ingestion:**

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

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

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

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

**Flammable Limits:** LOWER: 0.9% UPPER: 5.9%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:** Not available.

**Explosion Hazards in Presence of Various Substances:**

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

**Fire Fighting Media and Instructions:**

Flammable solid. **SMALL FIRE:** Use DRY chemical powder. **LARGE FIRE:** Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill:**

Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

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

### Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

### Personal Protection:

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

### Personal Protection in Case of a Large Spill:

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

### Exposure Limits:

Israel: TWA: 10 (ppm) STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m<sup>3</sup>) from ACGIH [1995]  
Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Crystalline solid.)

**Odor:** Aromatic.

**Taste:** Not available.

**Molecular Weight:** 128.19 g/mole

**Color:** White.

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

**Boiling Point:** 218°C (424.4°F)

**Melting Point:** 80.2°C (176.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.162 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** 4.4 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.038 ppm

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:**

Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

**Solubility:**

Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Highly reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** May attack some forms of rubber and plastic

**Polymerization:** No.

### Section 11: Toxicological Information

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

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

**Other Toxic Effects on Humans:**

Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

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

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** CLASS 4.1: Flammable solid.

**Identification:** : Naphthalene, refined : UN1334 PG: III

**Special Provisions for Transport:** Marine Pollutant

### Section 15: Other Regulatory Information

**Federal and State Regulations:**

Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

**Other Regulations:**

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

**Other Classifications:**

**WHMIS (Canada):**

CLASS B-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**

R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 2

**Reactivity:** 0

**Personal Protection:** E

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

**Health:** 2

**Flammability:** 2

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

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

## Section 16: Other Information

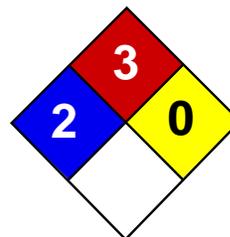
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/11/2005 01:30 PM

**Last Updated:** 05/21/2013 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](http://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, CO<sub>2</sub>).

**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 tetroxide; concentrated nitric acid, sulfuric acid + nitric acid; N<sub>2</sub>O<sub>4</sub>; AgClO<sub>4</sub>; BrF<sub>3</sub>; 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/m<sup>3</sup>) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid.

**Odor:** Sweet, pungent, Benzene-like.

**Taste:** Not available.

**Molecular Weight:** 92.14 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 110.6°C (231.1°F)

**Melting Point:** -95°C (-139°F)

**Critical Temperature:** 318.6°C (605.5°F)

**Specific Gravity:** 0.8636 (Water = 1)

**Vapor Pressure:** 3.8 kPa (@ 25°C)

**Vapor Density:** 3.1 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 1.6 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 2.7$

**Ionicity (in Water):** Not available.

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

**Solubility:**

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources (flames, sparks, static), incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:**

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

**Special Remarks on Chronic Effects on Humans:**

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia, ), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

## Section 12: Ecological Information

### Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

**BOD5 and COD:** Not available.

### Products of Biodegradation:

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

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

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

### Waste Disposal:

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

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification:** : Toluene UNNA: 1294 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

**Other Regulations:**

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

**Other Classifications:**

**WHMIS (Canada):**

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

**DSCL (EEC):**

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

**HMS (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

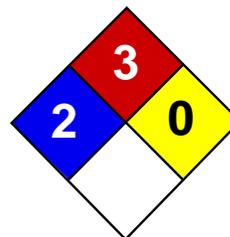
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:30 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## 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:** C<sub>6</sub>H<sub>4</sub>(CH<sub>3</sub>)<sub>2</sub>

**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](http://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, CO<sub>2</sub>).

**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/m<sup>3</sup>) [Canada] TWA: 434 STEL: 651 (mg/m<sup>3</sup>) 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;  $\log(\text{oil/water}) = 3.1$

**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 female 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 also cause 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:** 05/21/2013 12:00 PM

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# MATERIAL SAFETY DATA SHEET

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## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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**MATHESON TRI-GAS, INC.**  
**150 Allen Road Suite 302**  
**Basking Ridge, New Jersey 07920**  
**Information: 1-800-416-2505**

**Emergency Contact:**  
**CHEMTREC 1-800-424-9300**  
**Calls Originating Outside the US:**  
**703-527-3887 (Collect Calls Accepted)**

### **SUBSTANCE: VINYL CHLORIDE**

#### **TRADE NAMES/SYNONYMS:**

MTG MSDS 97; 1-CHLOROETHYLENE; 1-CHLOROETHENE; CHLOROETHYLENE;  
CHLOROETHENE; CHLORETHENE; CHLORETHYLENE; ETHYLENE MONOCHLORIDE;  
MONOCHLOROETHYLENE; MONOCHLORO ETHENE; MONOCHLOROETHENE; VINYL  
CHLORIDE MONOMER; VINYL CHLORIDE, INHIBITED; VINYL C MONOMER; RCRA U043; UN  
1086; C2H3Cl; MAT24940; RTECS KU9625000

**CHEMICAL FAMILY:** halogenated, aliphatic

**CREATION DATE:** Jan 24 1989

**REVISION DATE:** Dec 11 2008

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## 2. COMPOSITION, INFORMATION ON INGREDIENTS

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**COMPONENT:** VINYL CHLORIDE

**CAS NUMBER:** 75-01-4

**PERCENTAGE:** >99.9

**COMPONENT:** PHENOL

**CAS NUMBER:** 108-95-2

**PERCENTAGE:** <0.1

**COMPONENT:** INHIBITORS

**CAS NUMBER:** Not assigned.

**PERCENTAGE:** <0.1

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## 3. HAZARDS IDENTIFICATION

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**NFPA RATINGS (SCALE 0-4):** HEALTH=2 FIRE=4 REACTIVITY=1



**EMERGENCY OVERVIEW:**

**COLOR:** colorless

**PHYSICAL FORM:** gas

**ODOR:** faint odor, sweet odor

**MAJOR HEALTH HAZARDS:** harmful if swallowed, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans)

**PHYSICAL HAZARDS:** Flammable gas. May cause flash fire. May polymerize. Containers may rupture or explode.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, nausea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, joint pain, loss of coordination, hearing loss, lung congestion

**LONG TERM EXPOSURE:** impotence, bluish skin color, blood disorders, liver damage, cancer

**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation, blisters

**LONG TERM EXPOSURE:** irritation, blisters

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation, eye damage

**LONG TERM EXPOSURE:** irritation, eye damage

**INGESTION:**

**SHORT TERM EXPOSURE:** frostbite

**LONG TERM EXPOSURE:** cancer

---

## 4. FIRST AID MEASURES

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**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

**SKIN CONTACT:** If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

**EYE CONTACT:** Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

**INGESTION:** If a large amount is swallowed, get medical attention.

**NOTE TO PHYSICIAN:** For inhalation, consider oxygen.

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## 5. FIRE FIGHTING MEASURES

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**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Severe explosion hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**EXTINGUISHING MEDIA:** carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 500 meters (1/3 mile). Consider downwind evacuation if material is leaking.

**FLASH POINT:** -108 F (-78 C) (CC)

**LOWER FLAMMABLE LIMIT:** 3.6%

**UPPER FLAMMABLE LIMIT:** 33%

**AUTOIGNITION:** 882 F (472 C)

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## 6. ACCIDENTAL RELEASE MEASURES

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### **WATER RELEASE:**

Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Keep unnecessary people away, isolate hazard area and deny entry. Remove sources of ignition. Ventilate closed spaces before entering. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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## 7. HANDLING AND STORAGE

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**STORAGE:** Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Inside storage: Store in a cool, dry place. Store in a

well-ventilated area. Avoid heat, flames, sparks and other sources of ignition. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. See original container for storage recommendations. Keep separated from incompatible substances.

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## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

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### **EXPOSURE LIMITS:**

#### **VINYL CHLORIDE:**

1.0 ppm OSHA TWA

5 ppm OSHA STEL 15 minute(s)

0.5 ppm OSHA action level 8 hour(s)

1 ppm ACGIH TWA

NIOSH TWA (lowest feasible concentration)

**VENTILATION:** Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** For the gas: Wear appropriate chemical resistant gloves. For the liquid: Wear insulated gloves.  
OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1017.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

OSHA Standard:

Respirator selection should comply with 29 CFR 1910.134, 29 CFR 1910.1017, and the final rule published in the Federal Register on August 24, 2006.

NIOSH Recommendations:

#### **At any detectable concentration -**

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

#### **Escape -**

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.

Any appropriate escape-type, self-contained breathing apparatus.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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**PHYSICAL STATE:** gas

**COLOR:** colorless

**ODOR:** faint odor, sweet odor

**MOLECULAR WEIGHT:** 62.50

**MOLECULAR FORMULA:** C-H<sub>2</sub>-C-H-Cl

**BOILING POINT:** 9 F (-13 C)

**FREEZING POINT:** -245 F (-154 C)

**VAPOR PRESSURE:** 2515.6 mmHg @ 21.1 C

**VAPOR DENSITY (air=1):** 2.2

**SPECIFIC GRAVITY (water=1):** 0.9106

**WATER SOLUBILITY:** 0.25%

**PH:** Not applicable

**VOLATILITY:** Not applicable

**ODOR THRESHOLD:** 260 ppm

**EVAPORATION RATE:** Not applicable

**VISCOSITY:** 0.01072 cP @ 20 C

**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not applicable

**SOLVENT SOLUBILITY:**

**Soluble:** alcohol, ether, carbon tetrachloride, benzene

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## 10. STABILITY AND REACTIVITY

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**REACTIVITY:** May polymerize. Avoid contact with light or storage and use above room temperature.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

**INCOMPATIBILITIES:** metal carbide, metals, oxidizing materials, peroxides

**HAZARDOUS DECOMPOSITION:**

Thermal decomposition products: halogenated compounds, oxides of carbon, phosgene

**POLYMERIZATION:** May polymerize. Avoid contact with heat, light, air, water or incompatible materials. Closed containers may rupture violently.

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## 11. TOXICOLOGICAL INFORMATION

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**VINYL CHLORIDE:**

**TOXICITY DATA:** 18 pph/15 minute(s) inhalation-rat LC50; 500 mg/kg oral-rat LD50

**CARCINOGEN STATUS:** OSHA: Carcinogen; NTP: Known Human Carcinogen; IARC: Human Sufficient Evidence, Animal Sufficient Evidence, Group 1; ACGIH: A1 -Confirmed Human Carcinogen;

EC: Category 1

**LOCAL EFFECTS:**

Irritant: skin, eye

**ACUTE TOXICITY LEVEL:**

Toxic: ingestion

Relatively Non-toxic: inhalation

**TARGET ORGANS:** central nervous system

**TUMORIGENIC DATA:** Available.

**MUTAGENIC DATA:** Available.

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** Stimulants such as epinephrine may induce ventricular fibrillation. May cause birth defects.

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## 12. ECOLOGICAL INFORMATION

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**ECOTOXICITY DATA:**

**FISH TOXICITY:** 388000 ug/L 10 month(s) LETH (Mortality) Northern pike (Esox lucius)

**INVERTEBRATE TOXICITY:** 41.74 ug/L 72 day(s) (Residue) Mosquito (Culex pipiens quinquefasciata)

**ALGAL TOXICITY:** 41.74 ug/L 72 day(s) (Residue) Green algae (Oedogonium cardiacum)

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## 13. DISPOSAL CONSIDERATIONS

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Dispose in accordance with all applicable regulations. Hazardous Waste Number(s): D043. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.2 mg/L. U043.

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## 14. TRANSPORT INFORMATION

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**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Vinyl chloride, stabilized

**ID NUMBER:** UN1086

**HAZARD CLASS OR DIVISION:** 2.1

**LABELING REQUIREMENTS:** 2.1

**QUANTITY LIMITATIONS:**

**PASSENGER AIRCRAFT OR RAILCAR:** Forbidden

**CARGO AIRCRAFT ONLY:** 150 kg



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** Vinyl chloride, stabilized

**UN NUMBER:** UN1086

**CLASS:** 2.1

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## 15. REGULATORY INFORMATION

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### **U.S. REGULATIONS:**

#### **CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**Vinyl chloride:** 1 LBS RQ

**PHENOL:** 1000 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C):** Not regulated.

#### **SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):**

ACUTE: Yes

CHRONIC: Yes

FIRE: Yes

REACTIVE: Yes

SUDDEN RELEASE: Yes

#### **SARA TITLE III SECTION 313 (40 CFR 372.65):**

**Vinyl chloride**

**OSHA PROCESS SAFETY (29 CFR 1910.119):** Not regulated.

### **STATE REGULATIONS:**

#### **California Proposition 65:**

Known to the state of California to cause the following:

**Vinyl chloride**

Cancer (Feb 27, 1987)

### **CANADIAN REGULATIONS:**

**WHMIS CLASSIFICATION:** ABD2

### **NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

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## 16. OTHER INFORMATION

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**Appendix 12**  
Groundwater Treatment and Monitoring Plan for NYSDEC

*\*All information located within this document is privileged, confidential and/or proprietary\**

**Site-Specific Groundwater Treatment and Monitoring Plan**

for

**498 Leonard Street, Brooklyn, NY 11222**

**Block 2698, Lot 1**

**NYC VCP Number: 13CVCP144K**

**NYC E-Designation Site Number: 13EHAZ197K**

**NYSDEC Spill Nos. 1205075 and 1206982**



Prepared for:

Prepared by:

Mr. Jack Fung  
East Star Realty LLC.  
Brooklyn, NY



139 Fulton Street – Suite 907 - New York, NY 10038

[www.GRANTpllc.com](http://www.GRANTpllc.com)

January 21, 2014

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- Table 2 Petroleum Spill Stipulation Agreement Wastewater Limits for Groundwater Discharges

### Appendix

#### A Prior Environmental Investigations

- Hydro Tech Environmental Corporation (HTE) Phase II Tables and Figures dated October 2012
- GRANT engineers Remedial Action Work Plan dated July 30, 2013

#### B RegenOx and ORC Advanced Information

- ORC Advanced Pellets Product Sheet
- RegenOx Product Sheet
- ORC Advanced Product Sheet
- RegenOx Application Information
- ORC Advanced Application Information
- Case Study

## 1.0 INTRODUCTION

Per the request of New York State Department of Environmental Conservation (NYSDEC), GRANT engineering (GRANT) has prepared this Site-Specific Groundwater Treatment and Monitoring Plan (GWTMP) on behalf of Mr. Jack Fung of East Star Realty LLC. for the property located at 498 Leonard Street, Brooklyn, NY, Block: 2698, Lot 1 (hereinafter referred to as the “Site”). The Site is located in the Greenpoint section of Brooklyn. According to the New York City Department of Buildings (NYCDOB), the Site is listed with an E-Designation for hazardous materials. It should be noted that a Site-Specific Remedial Action Work Plan (RAWP) dated July 30, 2013 was submitted to the Mayor’s Office of Environmental Remediation (OER) to address the Site’s status in the Voluntary Cleanup Program (VCP).

The Site-Specific GWTMP will be submitted to the New York State Department of Environmental Conservation (NYSDEC) in order to propose treatment for contamination that exists at the Site and ultimately close Spill Nos. 1205075 and 1206982.

### 1.1 *Project Location and Description*

The Site is 7,400-square feet (74’ x 100’) and contains one 2-story commercial building and a paved lot with an underground storage tank (UST) present in the southwest portion of the property. The Site was formerly occupied by Brumar Sheet Metal Inc. and used for industrial purposes. The Site is currently unoccupied with a one-story vacant warehouse building and is owned by East Star Realty LLC. The Site is bounded by a 1-story structure commercial property to the north, Leonard Street to the west, a 2-story commercial property to the south, and a 2-story commercial property to the east. There is a mixture of industrial, light commercial and residential buildings in the immediate vicinity of the Site. The Site is located in a mixed-use district, containing both manufacturing and residential lots, designated as M1-2/R61 by zoning map 13a. The Site Location Map is shown in Figure 1. A map of the site boundary is shown in Figure 2.

The Site is proposed to be developed with a multi-story residential building. Redevelopment engineering will submit a final development plan to OER prior to the start of the remedial action. It is anticipated that the footprint of the planned residential structure will comprise the majority of the Site. The proposed plan is to demolish the existing structure and construct a multi-story residential building that is expected to include a 65’ x 74’ cellar. The proposed building is planned to be constructed starting from the property line along the length of Leonard Street and extending 65’ east. The cellar is proposed to be constructed to a depth above the water table of approximately 9 feet below grade (ftbg). In accordance with OER requirements, the entire Site will be excavated to a depth of approximately 13 (ftbg) and deeper in specific locations where contamination requires deeper excavation.

### 1.2 *Purpose and Scope of Work*

Two active NYSDEC Spills (Spill Nos. 1205075 and 1206982) are present at the Site. The presence of subsurface petroleum contamination in the groundwater has been confirmed during previous investigations and is likely due to the historic leaking underground storage tank (UST) located in the southwest portion of the property.

A leaking UST containing No. 2 fuel oil resulted in the NYSDEC Spill Case Number 1206982 opened on October 16, 2012. A spill from the leaking 5,000 gallon UST occurred on August 20, 2012 and resulted in a NYSDEC Spill Case Number 1205075. A spill of No. 2 fuel oil from a tank test failure occurred in 2003 (NYSDEC Spill Case Number 0212132) and was closed in 2006. The leaking UST impacted soil, groundwater and soil vapor at the Site. All spills were identified at Brumar Sheet Metal Inc. at 498 Leonard Street (the Site). The two (2) active spills have yet to be remediated and the tank is still an open case in the LTANKS database. The tank is proposed to be closed and removed in accordance with all

applicable regulations prior to construction which may reduce the amount of petroleum contamination present in groundwater. All oil remaining was pumped out of the UST on December 27, 2013.

GRANT proposes to mitigate the contamination from the spill at the Site in three stages: i) the existing site will be remediated via purging of product from the thirteen (13) existing monitoring wells on a monthly basis (product was detected in 3 of the 13 monitoring wells on December 30, 2013) ii) the Site will be excavated to approximately 13 ftbg, or deeper in locations where contamination is present, for construction of the proposed development (the existing UST tank will be removed during this effort) and the open excavation will be treated with a chemical application and iii) monitoring wells and contingency injection wells and will be installed in the cellar level of the proposed development at the Site to allow for future chemical injections after the construction is complete, if necessary.

Ten (10) monitoring wells (MW-1 to MW-5 and MW-8 to MW-13) are currently installed throughout the interior of the Site and three (3) monitoring wells are installed along the sidewalk on Leonard Street (MW-5, MW-6, and MW-7). However, monitoring well MW-7 was not accessible at the time of well gauging due to the presence of construction fencing along the west sidewalk of Leonard Street. The vertical and horizontal extents of Spill Nos. 1205075 and 1206982 have been delineated through soil, groundwater and soil vapor sampling during two previous environmental investigations that consist of Phase II Environmental Site Investigation (ESI) performed by Hydro Tech Environmental Corporation (HTE) in October 2012 and Remedial Investigation Report prepared by GRANT engineering (GRANT) in June 2013. GRANT prepared a RAWP for OER dated July 30, 2013 that includes all results the RIR. The results of the previous Phase II ESI by HTE and the RAWP prepared by GRANT are provided in Appendix A.

Product will be pumped from any of the thirteen (13) existing monitoring wells at the Site on a monthly basis prior to construction. The thirteen (13) monitoring wells consist of ten (10) monitoring wells located on the interior of the Site (MW-1, 2, 3, 4, 8, 9, 10, 11, 12, and 13) and the three (3) monitoring wells located on the sidewalk along Leonard Street (MW-5, 6 and 7). As of December 30, 2013, product ranging between 2 to 4 inches was detected in three monitoring wells (MW-1, MW-2 and MW-8). Groundwater will be measured in the thirteen (13) monitoring wells on a monthly basis and any product determined to be present in the existing thirteen (13) monitoring wells at the Site during groundwater sampling will be pumped out and disposed of in accordance with all applicable regulations in as requested by NYSDEC. A Site map with the existing monitoring wells and monitoring wells with product to be purged prior to construction is included for reference as Figure 3.

Following pre-construction groundwater sampling and purging of product, the proposed development of the project is estimated to commence in approximately four (4) months. After the existing building is demolished and soil is excavated to 13 ftbg throughout the Site as required by the RAWP approved by OER, an application of Oxygen Release Compounds (ORC) Advanced pellets (manufactured by Regenesis) will to be added to the open excavation and spread by mechanical equipment or by hand. The application of ORC Advanced is assumed to treat a layer approximately five (5) feet thick.

According to recommendations in the RAWP prepared for OER dated July 2013, the Site building must be designed to include the installation of a vapor barrier system beneath the proposed cellar floor and walls and an active sub-slab depressurization system to address migration of off-site soil vapors. The RAWP dated July 30, 2013 identified remedial requirements that included performance of a Community Air Monitoring Plan (CAMP) for particulates and VOC; establishment of Track 4 Soil Cleanup Objectives (SCOs) and excavation and removal of soil/fill exceeding SCOs; removal of arsenic and mercury hotspots; collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs; removal of the 5,000 gallon on site underground storage tank (UST) containing No. 2 fuel oil and any other unknown sub-grade storage tanks that may be present and closure

of the associated open petroleum spills (NYSDEC Spill Case numbers 1206982 and 0212132) under the authority of NYSDEC and in compliance with applicable local, State and Federal laws and regulations. Sampling of groundwater monitoring wells and treatment of groundwater under the authority of NYSDEC to address petroleum contamination; capping with concrete building slab in all developed areas and with two feet of certified clean fill in landscaped areas to prevent human exposure to residual soil/fill remaining under the Site; submittal of a Design Report for the vapor barrier system and sub slab depressurization system for OER approval prior to the start of development; and a demarcation of residual soil/fill;

Subsequent to the application of ORC Advanced to the open excavation area, five (5) monitoring wells and three (3) contingency injection points should be advanced in the southwest portion of the cellar level surrounding the area of the former UST. The three (3) monitoring wells previously installed on the sidewalk of Leonard Street (MW-5, MW-6 and MW-7) will be present following construction. The five (5) monitoring wells installed in the cellar and the three (3) monitoring wells on the sidewalk of Leonard Street should be sampled and analyzed to determine the levels of VOCs present as a result of the open spill cases in order to monitor the effectiveness of the previous remediation performed with ORC Advanced application to the excavation and determine if chemical injections are required. If results of the groundwater sampling determine that levels of VOCs present require further remediation, chemical injections may be performed through the injection wells using the selected chemicals RegenOx In-Situ Chemical Oxidation (RegenOx) and ORC Advanced (Manufacturer: Regenesis). RegenOx and ORC Advanced chemicals effective in remediating petroleum contamination in groundwater will be injected beneath the cellar floor slab and directed at the source of the groundwater plume. Groundwater samples will be collected from the eight (8) monitoring wells at 30-day intervals for a total of three (3) months following the completion of the chemical injection remedial work. The amounts of chemical injections needed should be determined based on the results of the groundwater sampling at that time. The number and location of injection wells required at the Site will be determined following the post construction groundwater sampling. A Site map with the proposed post-construction monitoring wells and contingency injection points is included for reference as Figure 4.

Following chemical application of ORC Advanced to the open excavation during construction, groundwater sampling post construction, and potential post-construction chemical injection well treatments, a final Remediation Action Report (RAR) will be prepared either recommending additional action or petitioning the NYSDEC to close the current spill number if the remedial objectives highlighted in this GWTMP have been satisfied. Delineation and characterization of the contamination in three (3) to six (6) months succeeding the chemical application of the excavation area as well as groundwater sampling and potential chemical injection wells will enable preparation of a remedial action report (RAR) to document contaminate mitigation and ultimately administratively close Spill Nos. 1205075 and 1206982.

## 2.0 SITE CONDITIONS AND ENVIRONMENTAL SETTING

A review of historic groundwater conditions at the Site was conducted by GRANT and presented in the Phase II ESI prepared by HTE dated October 2012, the RAWP report prepared by GRANT dated July 30, 2013, and groundwater level measurements performed by GRANT on December 30, 2013. A copy of the Tables and Figures from the HTE Phase II ESI and the RAWP prepared by GRANT is provided in Appendix A. A table with the groundwater level measurements obtained by HTE in October 2012 and GRANT on December 30, 2013 is provided in Table 1 below.

### 2.1 Site Location

The Site is 7,400-square feet (74' x 100') and contains one 2-story commercial building and a paved lot with an underground storage tank (UST) present in the southwest portion of the property. The Site was formerly occupied by Brumar Sheet Metal factory for industrial purposes and is currently vacant owned by East Star Realty LLC. The Site is located in the Greenpoint section of Brooklyn. According to the NYCDOB, the Site is listed as E-Designation for hazardous materials. The Site is bounded by a 1-story structure commercial property to the north, Leonard Street to the west, a 2-story commercial property to the south, and a 2-story commercial property to the east. There is a mixture of industrial, light commercial and residential buildings in the immediate vicinity of the Site. The Site is located in a mixed-use district, containing both manufacturing and residential lots, designated as M1-2/R61 by zoning map 13a. The Site Location Map is shown in Figure 1. A map of the site boundary is shown in Figure 2.

The Site is proposed to be developed with a multi-story residential building. Redevelopment engineering will submit a final development plan to the OER prior to the start of the remedial action. It is anticipated that the footprint of the planned residential structure will comprise the majority of the Site. The proposed plan is to demolish the existing structure and construct a multi-story residential building that is expected to include a 65' x 74' cellar. The proposed building is planned to be constructed starting from the property line along the length of Leonard Street and extending 65' east. As per OER requirements, the entire Site will be excavated to a depth of approximately 13 feet below grade (ftbg) or deeper in specific areas of contamination. The cellar is proposed to be constructed to a depth above the water table of approximately 9 ftbg.

#### 2.1.1 Topography

According to the U.S.G.S. (U.S. Geological Survey) 7.5/24K series Topographic Map of New York City Quadrangle, dated 1995, the Site elevation is approximately 16.0 ft above mean sea level (MSL). The surrounding topography slopes downward toward the west.

#### 2.1.2 Geology

The Site is located in the Borough of Brooklyn (Kings County), New York within the Atlantic Coastal Plain physiographic province. The subsurface geologic units in Kings County consist of sequences of unconsolidated sediments of Late Cretaceous and Pleistocene pre-Sangamon and Sangamon ages that are underlain by Precambrian crystalline bedrock, overlain by glacial deposits of Wisconsin age, and to a less extent, by Holocene deposits. Glacial drift deposits of Pleistocene (Wisconsin) age cover the majority of Kings County.

The Site is located in an area of unconsolidated glacial drift deposits. These deposits overlie the Gardiners Clay, Jameco Gravel and crystalline bedrock. The Jameco Gravel is believed to be Illinoian age, and comprises coarse sand and gravel with small amounts of silt and clay. The Gardiners Clay is an interglacial deposit of marine origin. It consists of clay with some intercalated thin sandy and gravelly beds, and marine fossil deposits. The upper Pleistocene deposits are mostly composed of glacial-drift material such as till, lacustrine deposits and outwash sand and gravel.

### 2.1.3 Hydrology

The Site lies within the Brooklyn-Queens Aquifer System, which includes Kings and Queens counties. The main aquifer underlying the subject sites is the Jameco Gravel unit. The major part of this aquifer is in a buried valley, which extends from the Flushing Meadow area to the area of the John F. Kennedy International Airport. Smaller parts of the Jameco occur in the Maspeth area, which is near the subject site. In this area, the thickness of the Jameco aquifer is generally less than 50 feet. The upper glacial aquifer is the uppermost water-bearing unit at the site.

The nearest surface water body to the Site is East River, which connects to Upper New York Bay and ultimately, the Atlantic Ocean. The East River is located approximately 2,500 feet to the west of the Site.

Based on the Remedial Investigation (RI) investigation, groundwater is present at approximately 9 ftbg.

**Table 1.** Depth to Water and Depth to Product Measurements and Groundwater Level Elevations

Monitoring Well Location	Benchmark*	Shot Elevation*	DTP 2012	DTW (before) 2012 (ft)	GW EL 2012	DTP 2013 (ft)	DTW 2013 (ft)	GW EL 2013
MW-1	30	5.59	<b>9.00**</b>	9.1	15.31	<b>9.00</b>	9.25	15.16
MW-2	30	5.55		9.2	15.25	<b>9.50</b>	9.67	14.78
MW-3	30	5.48		9.72	14.80	-	9.58	14.94
MW-4	30	5.72		9.48	14.80	-	9.42	14.86
MW-5	30	5.61		8.98	15.41	-	9.00	15.39
MW-6	30	6.26		8.97	14.77	-	9.00	14.74
MW-7	30	5.26		9.03	15.71	NA	NA	NA
MW-8	30	5.45		9.10	15.45	<b>9.00</b>	9.33	15.22
MW-9	30	5.40		9.75	14.85	-	9.50	15.10
MW-10	30	5.41		9.64	14.95	-	9.58	15.01
MW-11	30	5.61		9.53	14.86	-	9.42	14.97
MW-12	30	5.4		9.71	14.89	-	9.58	15.02
MW-13	30	5.5		9.68	14.82	-	9.50	15.00

DTW = Depth to Water

DTP = Depth to Product (shown in bold if detected)

NA = Not Accessible

GW EL = Groundwater Elevation

2012 = Groundwater level gauging performed by HTE Engineers in October 2012.

2013 = Groundwater level gauging performed by GRANT engineering in December 30, 2013.

\*Arbitrary benchmark level of 30 was chosen by HTE Engineers for calculating groundwater elevations and elevations of each monitoring well were shot for the Phase II ESI dated October 2012.

\*\*After product was detected in MW-1, HTE reportedly purged the wells and measured depth to water after purging. However, no other product levels were obtained during the water level gauging performed by HTE in 2012.

### 2.1.4 Underground Storage Tanks (USTs)

One (1) 5,000 gallon underground storage tanks (UST) is currently present in the southwest portion of the Site. The UST is listed on the LTANK database with Spill Nos. 1205075 and 1206982. All remaining product was pumped from the tank on December 27, 2013. As of December 30, 2013 product was detected in three (3) of the 13 monitoring wells (MW-1, MW-2 and MW-8) surrounding the UST ranging from 2" to 4" (see Table 1).

## **2.2 Surrounding Properties**

The Site is located at 498 Leonard Street, Brooklyn New York and is comprised of Block 2698 and Lot 11. The Site is 7,400-square feet and is bounded by a 1-story structure commercial property to the north, Leonard Street to the west, a 2-story commercial property to the south, and a 2-story commercial property to the east. A map of the site boundary is shown in Figure 2.

Located within a 250 to 500-foot radius of the properties are the following sensitive receptors:

- JHS 126 John Ericsson is a junior high school located 0.2 miles to the south.
- Williamsburg Charter School is located 0.2 miles South on Leonard Street.
- McCarren Park is located 0.3 miles to the Southwest.

## **2.3 Previous Environmental Assessments**

- Phase I ESA, dated February 12, 2013, prepared by GRANT engineering for OER.
- Phase II Environmental Site Investigation conducted by Hydro Tech Environmental Corporation (HTE) dated October 2012 for the prior owner Mr. John Tuey.
- Remedial Investigation Report (RIR) dated June 24, 2013 prepared by GRANT for OER.
- Remedial Action Work Plan (GWTMP) dated July 30, 2013 prepared by GRANT for OER.

The Phase I ESA identified Recognized Environmental Conditions (RECs) associated with the historic usage of the Site and surrounding properties. The Phase II conducted by HTE in October 2012 identified the presence of elevated SVOCs, metals and pesticides in surficial soil samples collected from the depth of 0-2 ftbg and elevated VOCs, SVOCs, metals, and pesticides in soil samples collected from 10-12 ftbg. The HTE Phase II also identified elevated VOCs, SVOCs, metals and pesticides in groundwater and elevated VOCs in soil vapor. Therefore, areas of concern (AOCs) are identified for this site.

1. One (1) underground storage tank (UST) present in the southwest portion of the Site with two open NYSDEC Spill Case numbers 1206982 and 0212132.
2. Petroleum contaminated soil located throughout the Site from approximately 12 to 30 ft bg.

### **Summary of the Remedial Investigation Report dated June 24, 2013**

GRANT performed the following scope of work:

1. Conducted a Site inspection to identify areas of concern (AOCs) and physical obstructions (i.e. structures, buildings, etc.);
2. In February 2013, installed five (5) soil borings (SB-01 to SB-05) surrounding the underground storage tank in the southwest portion of the Site. In April 2013, installed seven (7) soil borings (SB-06 to SB-12) across the entire project Site, and collected nineteen (19) soil samples for chemical analysis, and seven (7) of those samples had further finger printing analysis for determination of soil quality;
3. In April 2013, installed three (3) groundwater monitoring wells (TWP-01, TWP-02, and TWP-03) throughout the Site to establish groundwater flow and collected three (3) groundwater samples for chemical analysis to evaluate groundwater quality; and
4. Installed three (3) soil vapor probes (SVP-01, SV-02, and SVP-03) around the proposed future site perimeter and collected three (3) samples for chemical analysis.

The RIR identified the following findings:

1. Depth to groundwater was present at approximately ten (10) feet below grade at the Site during the RIR. HTE installed 13 monitoring wells on the Site and adjacent sidewalk in October 2012. The monitoring wells were surveyed and groundwater table elevations were measured between 14.77 and 15.71.

2. Groundwater flow direction is generally from the south towards the north.
3. Bedrock was not encountered during the RI.
4. The stratigraphy of the site from the surface down consists of a layer of historic fill material from approximately 0 to 12 feet below grade (ftbg), sand, gravel and silt with heavy petroleum impacts from 12-16 ftbg, visible petroleum staining from 16-30 ftbg in the area of the UST and an impacted layer of highly compressible organic peat, clay and silt from 16-28 ftbg throughout the remainder of the Site and a highly compressible layer of clay/silt that appears to function as an hydraulic barrier at approximately 28-34 ft bg.
5. Soils during Phase 2: Five SVOC (all PAH) exceeded both Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential SCOs in two of 13 shallow soil samples. The maximum concentration of these exceedances was 1.440 ppm. Seven SVOCs, all PAH, exceeded Track 2 Restricted Residential Use SCOs in up to eight of 15 deep soil samples. A variety of petroleum derived VOCs were detected but were below Track 1 SCOs in shallow soil samples. Four VOC, all petroleum derived compounds, exceeded Track 1 Unrestricted Use SCOs in deep soil samples but did not exceed Track 2 Restricted Residential Use SCOs. Maximum concentration of these exceedances was 57.1 ppm. One pesticide (dieldrin; maximum concentration 255 ppb) was detected above Track 2 Restricted Residential SCOs and three pesticides were also detected only above Track 1 Unrestricted SCOs in 2 to 4 shallow soil samples. Two pesticides were detected above Track 1 SCOs in deep samples but did not exceed Track 2 Restricted Residential Use SCOs. The following metals were detected above Track 2 Restricted Residential SCOs: arsenic (2 shallow samples, maximum 59 ppm; 5 deep samples, maximum 41.5 ppm), barium (1 shallow sample, maximum 777 ppm; 3 deep samples, maximum 879 ppm), cadmium (9 shall samples, maximum 6.85 ppm; 6 deep samples, maximum 3.75 ppm), lead (9 shall samples, maximum 2020 ppm; 6 deep samples, maximum 5730 ppm), mercury (3 shallow samples, maximum 25.3 ppm; 4 deep samples, maximum 5.12 ppm). Chromium, copper and zinc also exceeded Track 1 Unrestricted Use SCOs but not Track 2 Restricted Residential SCOs in both shallow and deep soil samples.
6. Soils during RI: PCBs were not detected in soil samples collected during the Remedial Investigation. One VOC, acetone was detected in two (2) samples (at 160 µg/kg and 404 µg/kg), above the Unrestricted Use SCO but well below Restricted Residential Use SCO. SVOCs were detected in one sample (12-16 feet) above the Restricted Residential Use SCOs. They include benzo(a)anthracene (11,600 µg/kg), benzo(a)pyrene (11,700 µg/kg), benzo(b)fluoranthene (9,840 µg/kg), chrysene (9,670 µg/kg), dibenzo(a,h)anthracene (1,900 µg/kg) and indeno(1,2,3-cd)pyrene (5,910 µg/kg). Elevated levels of metals including arsenic, copper, lead, mercury, vanadium, and zinc were detected above the Unrestricted Use Soil Cleanup Objectives (SCOs), and of these, arsenic (74 mg/kg), lead (1,440 mg/kg) and mercury (31 mg/kg) also detected above Restricted Residential Use SCOs. One pesticide 4,4-DDD was detected (11-13 feet) at 54.9 µg/kg, above the Unrestricted Use SCO but below the Restricted Residential Use SCO. The Gas Chromatograph (GC) fingerprint analysis conducted on seven borings did not identify the presence of any compounds with the exception of mineral spirits. Soil sample results are provided in Table 1.

GW during Phase 2: Thirteen groundwater samples collected during the Phase II showed 13 VOC's, all petroleum derivatives, above groundwater quality standards (GQS). All were below 50 ppb except benzene derivatives, which had a maximum concentration of 544 ppb. Seven SVOC, all PAH compounds, were observed above GQS. The maximum concentration was for Phenanthrene at 503 ppb. Five groundwater samples showed arsenic (3 samples, maximum 193 ppb), barium (3 samples, maximum 1900 ppb and lead (4 samples, maximum 84 ppb), and iron, manganese, magnesium and sodium above GWS. One pesticide, dieldrin, exceeded GQS (1 sample, 50 ppb).
7. Groundwater samples collected during the RI showed that SVOCs, pesticides and PCBs were not detected in the groundwater samples. Eight VOCs including 1,2,4-trimethylbenzene (7.7 ug/l),

1,2,4,5-trimethylbenzene (135 ug/l), tert-butylbenzene (43 ug/l), isopropylbenzene (70 ug/l), n-propylbenzene (121 ug/l), n-butylbenzene (63 ug/l), and sec-butylbenzene (160 ug/l) were detected above GQS of 5 ppb. Three metals including arsenic (25 ppb), lead (36 ppb), and mercury (1.6 ppb) were detected above GQS. Groundwater sample results are provided in Table 2.

8. Phase 2: One chlorinated VOC was detected in one of four soil vapor samples (PCE, 30 ug/m<sup>3</sup>). TCE, 111-TCA and carbon tetrachloride were not detected. These findings were below State DOH monitor levels. Five petroleum derivatives were also detected with maximum concentrations of up to 61 ug/m<sup>3</sup>.
9. RI: Soil vapor samples collected during the RI showed a variety of VOCs, including petroleum hydrocarbons and chlorinated VOCs. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclobenzene, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected. Chlorinated VOCs including 1,1,1-trichloroethane (40 ug/m<sup>3</sup>), carbon tetrachloride (23 ug/m<sup>3</sup>), tetrachloroethylene (50 ug/m<sup>3</sup>), and trichloroethylene (20 ug/m<sup>3</sup>) were at concentrations that are below the monitoring level ranges established within the State DOH soil vapor guidance matrix. Soil vapor results are provided in Table 3.

### **Summary of the RAWP prepared for OER dated July 30, 2013**

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The preferred remedial action alternative is a Track 4 remedial action. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC BCP citizen participation activities according to an approved Citizen Participation Plan (CPP);
2. Performance of a Community Air Monitoring Plan (CAMP) for particulates and VOCs.
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs. Removal of arsenic and mercury hotspots;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs;
5. Removal of the 5,000 gallon on site underground storage tank (UST) containing No. 2 fuel oil and any other unknown sub-grade storage tanks that may be present and closure of the associated open petroleum spills (NYSDEC Spill Case numbers 1206982 and 0212132) under the authority of NYSDEC and in compliance with applicable local, State and Federal laws and regulations.
6. Sampling of groundwater monitoring wells and treatment of groundwater under the authority of NYSDEC to address petroleum contamination;
7. Capping with concrete building slab in all developed areas and with two feet of certified clean fill in landscaped areas to prevent human exposure to residual soil/fill remaining under the Site;
8. Installation of a vapor barrier system beneath the proposed cellar floor and walls of the Site building and an active sub-slab depressurization system to address migration of off-site soil

- vapors. Submittal of a Design Report for the vapor barrier system and sub slab depressurization system for OER approval prior to the start of development;
9. Demarcation of residual soil/fill;
  10. Import of materials to be used for backfill and cover, as needed, in compliance with OER approved plan and in accordance with applicable Federal, State and City laws and regulations;
  11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
  12. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
  13. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
  14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
  15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
  16. Groundwater treatment to address the petroleum spill under NYSDEC authority;
  17. Performance of groundwater sampling from all remaining monitoring wells after remediation is completed consistent with NYSDEC requirements for spill closure. If needed, additional means of groundwater remediation for may be required as determined by NYSDEC;
  18. Submission of a Remedial Action Report (RAR) that describes the remedial activities certifies including any changes from this RAWP, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all engineering and institutional controls to be implemented at the Site, and lists any changes from this RAWP;
  19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of engineering and institutional controls and reporting at a specified frequency; and
  20. Continued registration with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls and management of these controls in compliance with an approved SMP. Institutional controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

Figures 4 to 11 of the RAWP dated July 30, 2013 in Appendix B show the combined results of all soil, groundwater and soil vapor samples collected by HTE in 2012 and GRANT in 2013. The samples consist of 36 shallow soil samples collected from the 18 soil boring locations advanced by HTE, 19 soil samples collected from seven (7) soil borings SB-6 to SB-12 advanced by GRANT (soil borings SB-01 to SB0-05 were advanced by GRANT and no soil samples were collected), sixteen (16) total groundwater samples from thirteen (13) permanent monitoring wells installed by HTE and three (3) temporary well points installed by GRANT, and seven (7) total soil vapor samples that consist of four (4) soil vapor samples installed by HTE and three (3) soil vapor samples installed by GRANT.

### 3.0 REMEDIAL ACTION OBJECTIVES

The following Remedial Action Objective (RAO) has been identified for this Site according to the correspondence from the NYSDEC regarding Spill Nos. 1205075 and 1206982:

- Remediate contaminated groundwater in accordance with the New York Department of Environmental Conservation Guidance for Petroleum Spill Stipulation Agreement

The NYSDEC Guidance for Petroleum Spill Stipulation Agreement details regulatory limits to be used in the Stipulation. The relevant regulatory limits for this application are the groundwater discharge limits. Table 2 summarizes the NYSDEC Limits for Groundwater Discharges of VOCs. The levels for Fuel Oil Contamination will be used as objectives for the remedial activities at the Site.

**Table 2.** Petroleum Spill Stipulation Agreement Wastewater Limits for Groundwater Discharges

Compound	Gasoline (ug/L)	Fuel Oil (ug/L)
Benzene	1	1
Ethyl Benzene	5	5
Toluene	5	5
o-Xylene	5	5
-Xylene	5	5
p- & m- Xylenes	5	5
Xylenes, Total	5	5
Naphthalene	10	10
Methyl tert-butyl ether (MTBE)	10	10
n-Propylbenzene	5	5
4-Isopropylbenzene	5	5
1,2,4-Trimethylbenzene	5	5
1,3,5-Trimethylbenzene	5	5
n-Butylbenzene	5	5
sec-Butylbenzene	5	5
tert-Butylbenzene	5	5
Anthracene	NA	50
Dibenz (a,h) anthracene	NA	50
Fluorene	NA	50
Fluoranthene	NA	50
Phenanthrene	NA	50
Pyrene	NA	50
Acenaphthene	NA	20
Benzo(a)anthracene	NA	20
Benzo(b)fluoranthene	NA	20
Chrysene	NA	20
Benzo(a)pyrene	NA	20
Benzo(g,h,i)perylene	NA	20
Ideno(1,2,3-c,d)pyrene	NA	20
Benzo(k)fluoranthene	NA	20

#### 4.0 REMEDIAL ACTION SCOPE OF WORK

Prior to field efforts, the drilling contractor will contact the New York One-Call center and arrange for mark outs of public utilities at the Site. Remedial work is proposed in three (3) stages: i) chemical injection wells prior to construction and ii) chemical application during construction and excavation and iii) contingency chemical injection wells and monitoring wells in the cellar post construction.

##### i) Pre-Construction Remediation

The proposed remedial work will consist of the following for Pre-Construction Remediation:

**Purging of Product in Existing Monitoring Wells** - Product present within any of the thirteen (13) existing monitoring wells at the Site will be pumped out and disposed of in accordance with applicable regulations on a monthly basis. All fuel oil present within the UST on site was pumped out on December 27, 2013. As of December 30, 2013, product was detected in three (3) of the 13 monitoring wells (MW-1, MW-2 and MW-8) surrounding the UST ranging from 2” to 4” in thickness.

**Groundwater Sampling** – Thirteen (13) permanent monitoring wells are present throughout the Site and adjacent area on the sidewalk along Leonard Street. The thirteen (13) monitoring wells will be developed and groundwater sampled will be collected for laboratory analysis prior to the chemical injection event. After the injection event, all thirteen (13) monitoring wells will be sampled monthly for a period of 3 three months to characterize the current and post-remedial physical and chemical characteristics of the groundwater. Depth to water and depth to product measurements present in each monitoring well will be noted at the time as groundwater sampling. If any product is detected in monitoring wells present at the site, product will be pumped out of each well on a monthly basis, as per the request of the NYSDEC.

A Site Map with the proposed injection well locations is included for reference as Figure 3 – Pre-Construction Remedial Plan. Roadway/Sidewalk opening permits will not be required for this project.

##### ii) Remediation of Excavation

Following excavation of the Site to a depth of approximately 13 ftbg for the proposed development, the proposed remedial work will consist of the following:

**Chemical Application** – A chemical application consisting of ORC Advanced pellets as manufactured by Regenesys Inc will be applied throughout the open excavation area after excavation to 13 ftbg is completed and groundwater table is reached for construction of the proposed development. ORC Advanced pellets may be spread by mechanical equipment or by hand. The application of ORC Advanced is assumed to treat a layer approximately five (5) feet thick. See Appendix B for information on the ORC Advanced product.

According to recommendations in the RAWP prepared by GRANT for OER dated July 30, 2013, the Site building must be designed to include the installation of a vapor barrier system beneath the proposed cellar floor and walls and an active sub-slab depressurization system to address migration of off-site soil vapors as per OER requirements. The RAWP identified remedial requirements that included performance of a Community Air Monitoring Plan (CAMP) for particulates and VOC; establishment of Track 4 Soil Cleanup Objectives (SCOs) and excavation and removal of soil/fill exceeding SCOs; removal of arsenic and mercury hotspots (entire site down to 13 ftbg and deeper if needed for hotspots); collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs; removal of the 5,000 gallon on site underground storage tank (UST) containing No. 2 fuel oil and any other unknown sub-grade storage tanks that may be present and closure of the associated open

petroleum spills (NYSDEC Spill Case numbers 1206982 and 0212132) under the authority of NYSDEC and in compliance with applicable local, State and Federal laws and regulations. Sampling of groundwater monitoring wells and treatment of groundwater under the authority of NYSDEC to address petroleum contamination; capping with concrete building slab in all developed areas and with two feet of certified clean fill in landscaped areas to prevent human exposure to residual soil/fill remaining under the Site; submittal of a Design Report for the vapor barrier system and sub slab depressurization system for OER approval prior to the start of development; and a demarcation of residual soil/fill;

**iii) Post-Construction Remediation**

The proposed remedial work will consist of the following for Excavation and Post-Construction Remediation:

**Groundwater Sampling** – Subsequent to the application of ORC Advanced to the open excavation area, five (5) monitoring wells should be advanced in the cellar level including the southwest portion surrounding the area of the former UST. The three (3) monitoring wells previously installed on the sidewalk of Leonard Street (MW-5, MW-6 and MW-7) will be present following construction. The five (5) monitoring wells installed in the cellar and the three (3) monitoring wells on the sidewalk of Leonard Street should be sampled and analyzed to determine the levels of VOCs present as a result of the open spill cases and in order to monitor the effectiveness of the previous remediation performed with the ORC Advanced chemical application of the excavation. Samples will be collected from the eight (8) monitoring wells at 30-day intervals for a total of three (3), six (6) and nine (9) months following the completion of the chemical application remedial work of the excavation. This groundwater monitoring is proposed to characterize the post-remedial physical and chemical characteristics of the groundwater as per the request of the NYSDEC.

**Contingency Chemical Injection** – Subsequent to the application of ORC Advanced to the open excavation area, three (3) contingency injection well points should be advanced in the southern portion of the cellar level surrounding the area of the former UST. If results of the groundwater sampling determine that the levels of VOCs present require further remediation, chemical injections may be performed through the contingency injection wells using RegenOx and ORC Advanced injections. Additional injection points may be required at the Site based on the results of the post construction groundwater sampling. The total number and location of injection points and amount of chemical injections needed should be determined based on the results of the post-construction groundwater sampling. It is assumed that three injection wells will be installed in the cellar of the proposed building for future chemical injection, however additional directional injection points may be installed at various locations and depths as needed to satisfy NYSDEC clean-up requirements. See Appendix B for information on the RegenOx and ORC Advanced products.

A Site Map with the proposed monitoring well and contingency injection locations is included for reference as Figure 4 – Post Construction Remedial Plan.

**4.1 Groundwater Sampling and Gauging**

Prior to construction, the assessment of groundwater quality will include the collection of groundwater samples from the existing monitoring wells thirteen (13) (MW-1 to MW-13). Thirteen (13) groundwater samples will be collected from the monitoring wells as part of the GWTMP and analytical results will be analyzed for TCL VOCs and compared to GA Groundwater limits. Depth to water and depth to product measurements present in each monitoring well will be noted at the time as groundwater sampling. If any product is detected in monitoring wells present at the site, product will be pumped out of each well on a monthly basis, as per the request of the NYSDEC.

Post construction, the assessment of groundwater quality will include the collection of groundwater samples from the five (5) monitoring wells to be installed in the cellar of the proposed development and the three (3) previously installed monitoring wells (MW-5, MW-6 and MW-7) on the sidewalk along Leonard Street adjacent to the Site.

#### **4.2 Chemical Application of Open Excavation**

Following pre-construction chemical injections and remediation of the Site, the existing building will be demolished, the on-site building will be demolished and the Site will be excavated to a depth of approximately 13 ftbg.

Petroleum hydrocarbon plumes are typically depleted in oxygen which limits the ability of naturally occurring microorganisms to degrade petroleum hydrocarbons. Oxygen Release Compound Advanced (ORC Advanced) supplies a controlled release of oxygen for 9-12 months in the target treatment zone to create and support the geochemical environment necessary for aerobic biodegradation of contaminants.

ORC Advanced is recommended to treat residual petroleum hydrocarbons following excavation of source area contaminants and removal of the on-site UST. More technical information on ORC Advanced can be found in the Product Sheet in Appendix B.

#### **Application**

ORC Advanced Pellets are specifically engineered for use in excavations. They may be spread with mechanical equipment or by hand. The ORC Advanced is estimated to treat a layer approximately five (5) feet thick. Regardless of methods used to emplace the ORC Advanced Pellets, it is estimated that approximately 55.1 pound bag packaging or 25 kg plastic containers of ORC Advanced will be required to remediate the source area, assuming that the area is approximately 7,400 square feet and the vertical treatment thickness is 5 feet. This translates to an amount of 2,700 pounds of product quantity to be used. More details about the product ORC Advanced from the manufacturer Regenesys including product data sheets, technical paper, and a recent case study of its implementation are included as Appendix B.

Hotspot areas will be excavated under this remedial action including arsenic and mercury hotspots identified in the Remedial Investigation and end point remedial performance samples will be collected as discussed below. The total quantity of soil/fill expected to be excavated and disposed off-Site in the area of the proposed cellar (65'x74'x10') is approximately 1,782 cubic yards or 2,673 tons. Soil excavation below the water table is anticipated for the area surrounding the UST to be closed and removed in the southwest portion of the Site. The area of petroleum impacted soil may be excavated until no visual evidence of petroleum impacts are present and laboratory analysis confirms the required end point samples taken meet regulatory requirements. Based on the borings advanced during the RI, the area surrounding the on-site UST to be remediated is estimated at up to approximately (40' x 50') 2,000 square feet. The proposed building footprint and cellar will occupy the present area of the UST. Therefore, petroleum impacted material is estimated to be excavated from 10 feet below grade up to 30 feet below grade or until non-impacted material is observed. Therefore, a maximum of (40' x 50' x 20') approximately 1,482 cubic yards or 2,223 tons of petroleum impacted material may be removed at the Site. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

#### **4.4 Monitoring Wells and Contingency Chemical Injections for Post Construction Remediation**

##### **Post Construction Monitoring Wells and Injection Points**

Following construction of the proposed development, five (5) monitoring wells should be installed in the four corners and southwest portion of the cellar level in the former area of the UST to monitor groundwater quality following remediation of the open excavation during construction. See Figure 4 for

proposed monitoring well and contingency injection points post construction. The monitoring wells will be advanced using a remote unit drill rig to a depth of five (5) ftbg since the cellar level of the proposed development will be constructed just above the approximate level of groundwater at nine (9) ftbg. A 2” PVC slotted pipe will be installed by hand to the full depth of the monitoring well and a bentonite seal will be created. The three (3) previously installed monitoring wells (MW-5, MW-6 and MW-7) will be present following construction along with the five (5) newly constructed monitoring wells in the cellar level of the proposed development. Eight (8) groundwater samples will be collected from the monitoring wells as part of the GWTMP and analytical results will be analyzed for TCL VOCs and compared to GA Groundwater limits.

If injection wells are required, RegenOx and ORC Advanced (manufactured by Regenesis) may be utilized. RegenOx is an advanced chemical oxidation technology that destroys contaminants through controlled chemical reactions. This product maximizes in-situ performance while using a solid alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. RegenOx directly oxidizes contaminants while its catalytic component generates a range of highly oxidizing free radicals that rapidly destroy a range of target contaminants including both petroleum hydrocarbons and chlorinated compounds. One of the key benefits of RegenOx is that it quickly creates aerobic conditions and makes more contaminants bioavailable. This effect can often result in an increase in microbial populations following injection. The oxygen from RegenOx will typically dissipate in a few weeks as it is utilized in oxidation reactions. Generally speaking, it is desirable to sustain these aerobic conditions when treating aerobically degradable contaminants (e.g., fuel hydrocarbons) when it is suspected that dissolved-phase contamination may persist following a chemical oxidation application. For this reason applications of ORC Advanced are also proposed to sustain a source of oxygen and facilitate long-term aerobic bioremediation of residual contaminants. ORC Advanced contains 17% oxygen by weight and will provide a controlled release of oxygen to the subsurface for approximately 9 to 12 months. More technical information on RegenOx and ORC Advanced are provided in Product Sheets in Appendix B.

It is recommended that these products be applied in situ, either sequentially (RegenOx followed by ORC Advanced) or simultaneously (RegenOx and ORC Advanced) during the final RegenOx injection event. Materials are typically applied using a direct push technology (DPT) injection method. It is important that the materials be applied per the design, including material loading rates and injection point spacing specified to the extent site conditions allow. A brief description of the application method for these products is provided in Appendix B.

### **Application**

The amounts of chemical injections needed, if any, will be determined based on the results of the groundwater sampling performed following construction of the proposed development. If chemical injections will be required post construction, the chemical products RegenOx and ORC Advanced may be utilized. More details about the product RegenOx and ORC Advanced from the manufacturer (Regenesis) including product data sheets, technical paper, and a recent case study of its implementation are included as Appendix B.

RegenOx is applied as a high-volume liquid consisting of the oxidant (Part A) and the catalyst (Part B). Typical solution application rates are in the range of 5% oxidant-in-solution as proposed in this GWTMP. Almost all in-situ chemical oxidation (ISCO) projects regardless of reagent require multiple injections events to deplete contaminant mass in high concentration areas. Multiple applications of chemical oxidants are usually required for two reasons: 1) high-concentration source areas typically contain too much contaminant mass to overcome with a single application of any oxidant and 2) aquifers will “accept” a limited volume of fluid during a single injection event. This fluid volume limit (equivalent to 2-10% total porosity per event at most sites) is typically lower than the oxidant volume required to

achieve an adequate distribution, and to deliver sufficient mass of oxidant to overcome contaminated demand. Testing of the fluid acceptance rates within the treatment zone, using clear water, may be necessary to confirm the per point fluid injection rates proposed. Otherwise, per-point injection volumes and/or the number of points may be necessary to confirm the per-point injection volumes and/or the number of points may be modified in the field as needed.

Three (3) contingency injection wells will be installed for the application of the oxidant and catalyst RegenOx and ORC Advanced. The total number of injection points required will be determined following post construction groundwater sampling. Typically, injection points are positioned at a distance approximately 10 feet apart within the approximate contamination source area (estimated to be approximately 2,000 square feet in the southwest portion of the building). The injection points will be advanced using a remote unit drill rig to a depth of ten (10) ftbg since the cellar level will be present at the approximate level of groundwater at nine (9) ftbg. A 1” PVC slotted pipe will be installed by hand to the full depth of the injection point and a bentonite seal will be created.

If results of the groundwater sampling post construction determine that the levels of VOCs present require further remediation, chemical injections may be performed through the three (3) contingency injection wells using RegenOx and ORC Advanced injections.

#### **4.5 Site Management, Sample Management and General Documentation**

Upon completion of post-construction groundwater sampling, all injection wells will be removed. Investigation derived waste (IDW) such as drill cuttings and purge water will be generated during this investigation and will be disposed of off-site in 55-gallon drums per all applicable local, state and federal regulations. All monitoring wells will remain onsite for post-remedial action data collection.

A comprehensive visual documentation (photographic) log will be taken during the site assessment field activities. Photographs documenting sampling locations shall include two or more permanent reference points to facilitate relocating the sample location at a later date.

Sample handling and chain-of-custody procedures will be maintained at all times. Chain-of-custody control will be initiated by the field engineer at the time of sample collection. Samples will be picked up by a laboratory courier or delivered to the laboratory at the completion of field work based on a work completed schedule, which will facilitate chain of custody transfer of the samples. Certificate of approval from the laboratory and all chain-of-custody sheets with signature of field engineer and laboratory courier shall be included in the appendix of the site investigation report. Entries made on the chain of custody to include 1) site, 2) sampler(s), 3) sample designations, 4) date, 5) time, 6) sample matrix, 7) number of containers 8) preservatives, 9) analytical methods, and 10) any appropriate remarks.

Following chemical application of the excavation area with ORC Advanced during construction, post construction groundwater sampling and potential chemical injections with RegenOx and ORC Advanced, a final Remediation Action Report (RAR) will be prepared either recommending additional action or petitioning the NYSDEC to close the current spill number if the remedial objectives highlighted in this GWTMP have been satisfied. Delineation and characterization of the contamination before and in the three months succeeding the chemical injection event will enable preparation of a remedial action report (RAR) to document contaminate mitigation and ultimately administratively close Spill Nos. 1205075 and 1206982.

#### **4.6 Remedial Action Health and Safety Plan**

An OSHA-compliant remedial action Health and Safety Plan (HASP) will be implemented during the site work to protect worker safety for all HAZWOPER requirements. The Site Safety Coordinator will ensure full compliance of the HASP in accordance with applicable health and safety laws and regulations. All field personnel involved in investigation activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Emergency telephone numbers will be posted at the site location before any work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics including a highlighted route map to the nearest hospital/emergency room. Meetings will be documented in a log book or specific form.

## **5.0 POST-REMEDIAL WORK MONITORING AND REPORTING**

Groundwater samples will be collected from all thirteen (13) monitoring wells that currently exist at the Site prior to construction 30, 60, and 90 days and any product present will be pumped out and from the eight (8) monitoring wells present post-construction (5 monitoring wells to be constructed in the cellar level of the proposed development and three (3) previously installed monitoring wells present on the sidewalk along Leonard Street adjacent to the Site). After the post-construction groundwater sampling event, a decision will be made on whether or not the remediation efforts warrant additional injections through three (3) contingency injection wells or additional injection wells, additional sampling and analysis of groundwater, other remediation procedures, or a combination of any of these actions.

A Remedial Action Report (RAR) will be prepared upon completion of the field investigations. The RAR will consist of a technical overview of the work performed, results of sampling and analysis at the Site following chemical injections, and conclusions and recommendations for any of the aforementioned courses of action. In addition, the RAR will include groundwater level measurements and sample results, and summarized analytical tables with all contaminant constituents with correlating New York Department of Environmental Conservation Guidance for Petroleum Spill Stipulation Agreement standards and laboratory analytical sheets with chains of custody (COCs).

If additional work is required, GRANT will prepare an additional scope of work detailing the proposed remedial work. Otherwise, GRANT will petition NYSDEC to administratively close the Spill Number if the remedial objectives highlighted in this document are satisfied as a result of the chemical injection remediation effort.

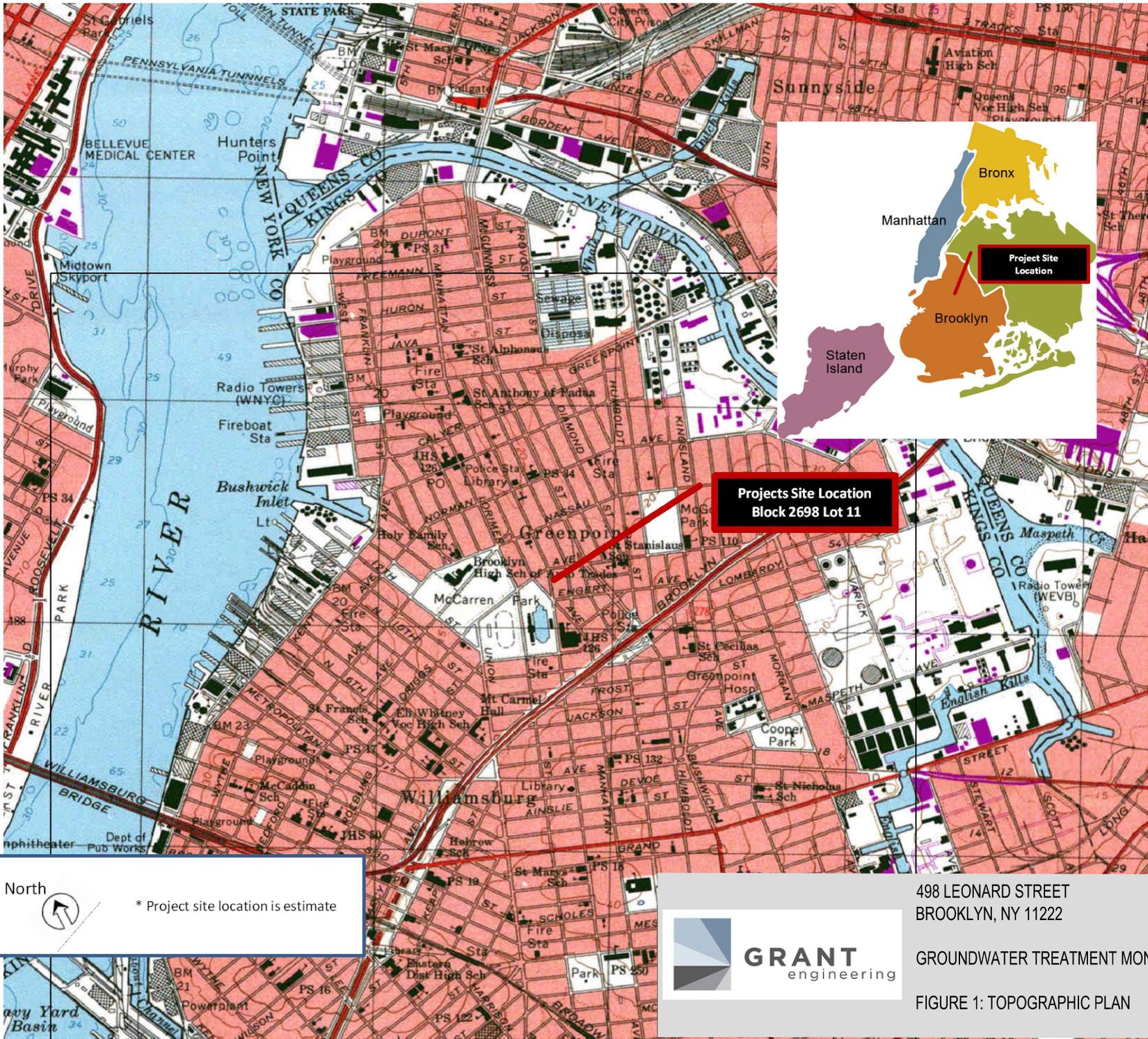
## **FIGURES**

Figure 1 – Site Location map

Figure 2 – Site Map

Figure 3 – Pre Construction Remedial Plan

Figure 4 – Post Construction Remedial Plan



North



\* Project site location is estimate

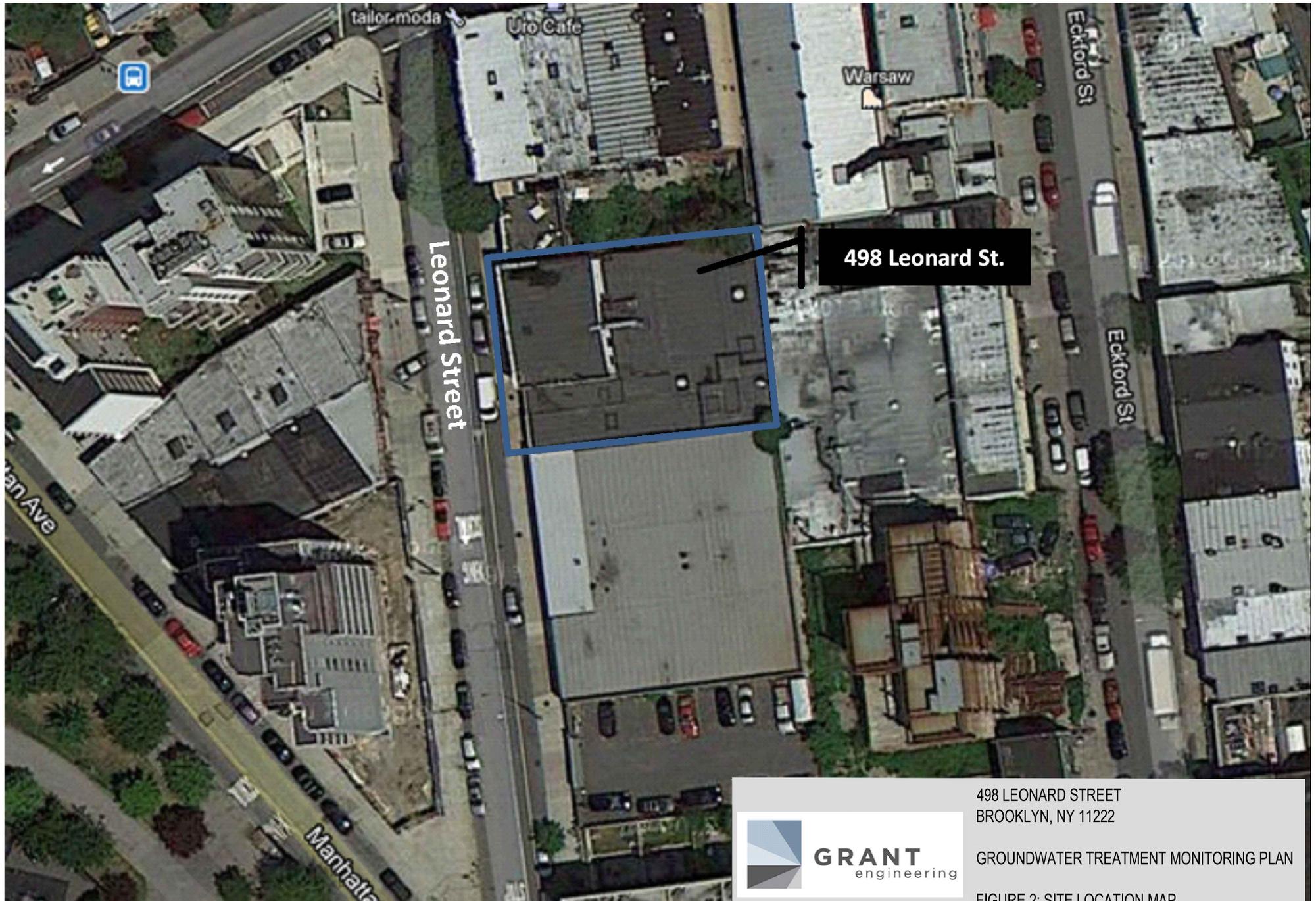


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498 LEONARD STREET  
BROOKLYN, NY 11222

GROUNDWATER TREATMENT MONITORING PLAN

FIGURE 1: TOPOGRAPHIC PLAN



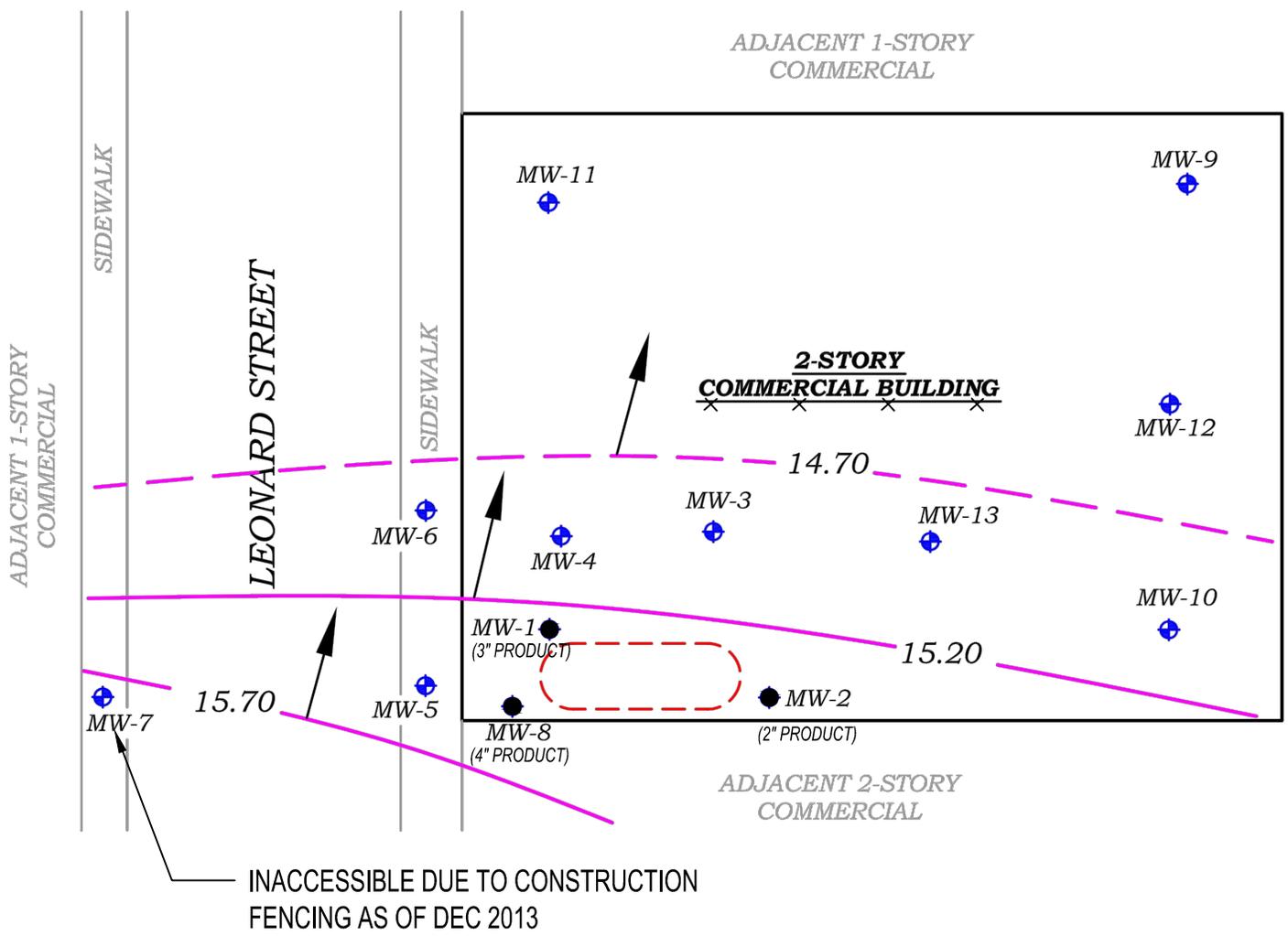
498 Leonard St.

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engineering

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GROUNDWATER TREATMENT MONITORING PLAN

FIGURE 2: SITE LOCATION MAP



ADJACENT 2-STORY COMMERCIAL

C.I. = 0.50 Feet

Monitoring Well IDs	Groundwater Elevations October 2012	Groundwater Elevations December 2013
MW-1	15.31	15.16
MW-2	15.25	14.78
MW-3	14.80	14.94
MW-4	14.80	14.86
MW-5	15.41	15.39
MW-6	14.77	14.74
MW-7	15.71	NA
MW-8	15.45	15.22
MW-9	14.85	15.10
MW-10	14.95	15.01
MW-11	14.86	14.97
MW-12	14.89	15.02
MW-13	14.82	15.00

- ◆ MONITORING WELL LOCATION (MW)
- MONITORING WELL LOCATION WITH PRODUCT TO BE PUMPED
- DASHED WHERE INFERRED
- ~ CONTOUR LINES
- C.I. CONTOUR INTERVAL

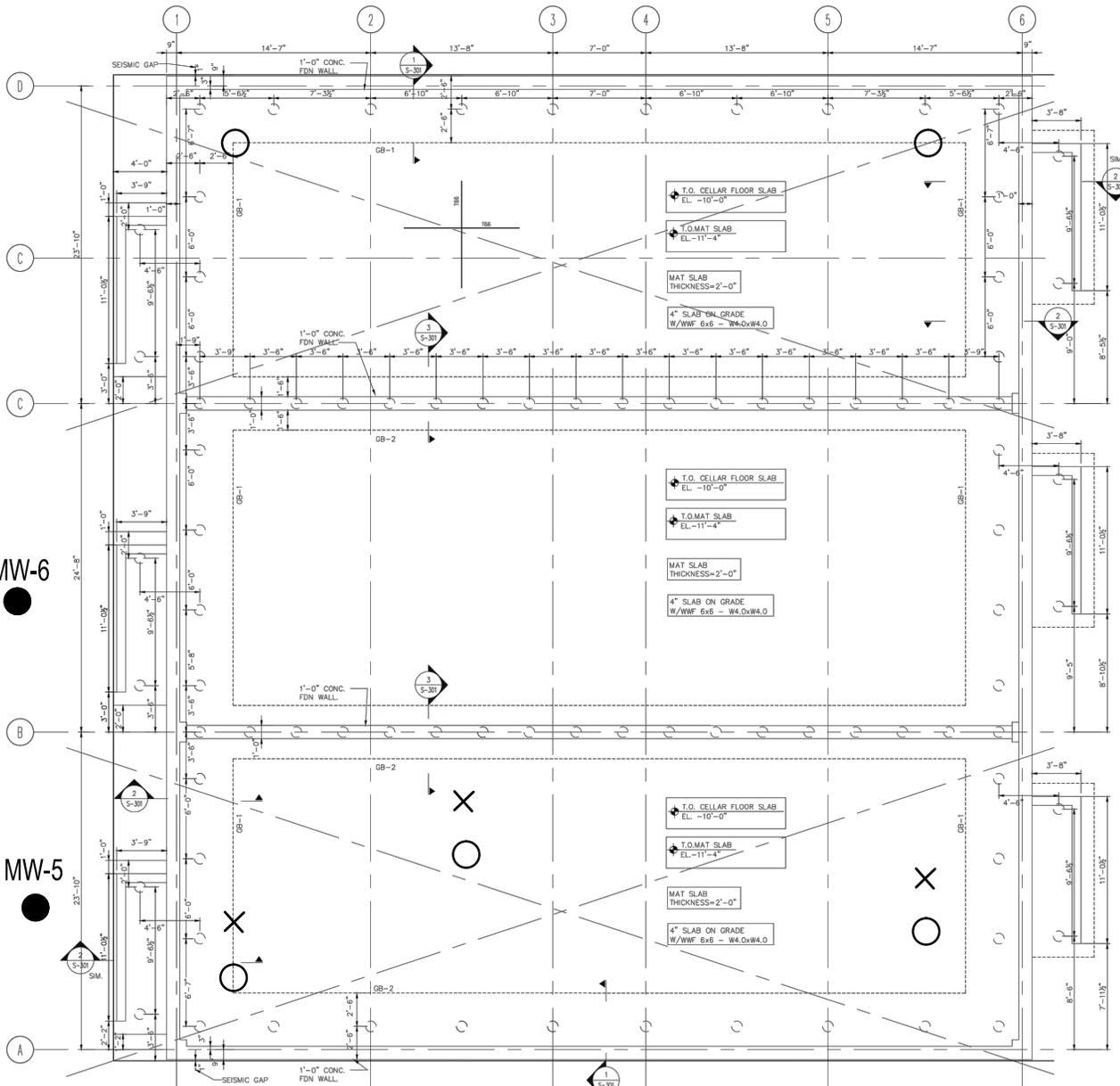
- NOTES:
1. DECEMBER 2013 GROUNDWATER ELEVATIONS TAKEN BY GRANT engineering
  2. OCTOBER 2012 GROUNDWATER ELEVATIONS TAKEN BY HYDROTECH ENVIRONMENTAL CORP. (HTE)
  3. ACCORDING TO GROUNDWATER MEASUREMENTS TAKEN ON 12/30/2013 BY GRANT engineering, MW-1 CONTAINED 3 INCHES OF PRODUCT, MW-2 CONTAINED 2 INCHES OF PRODUCT, AND MW-8 CONTAINED 4 INCHES OF PRODUCT.



498 LEONARD STREET  
BROOKLYN, NY 11222

GROUNDWATER TREATMENT MONITORING PLAN

FIGURE 3: PRECONSTRUCTION REMEDIAL PLAN



- EXISTING MONITORING WELL
- PROPOSED MONITORING WELL
- × CONTINGENCY CHEMICAL INJECTION WELL (Final location and number of injection wells to be determined based on groundwater samples collected post-construction)

MW-6

MW-5

MW-7



498 LEONARD STREET  
BROOKLYN, NY 11222

GROUNDWATER TREATMENT MONITORING PLAN

FIGURE 4: POSTCONSTRUCTION REMEDIAL PLAN

## **APPENDICES**

### Appendix A – Prior Environmental Investigations

- HydroTech Environmental Corporation Phase II Tables and Figures dated October 2012
- GRANT engineering Remedial Action Work Plan (7/30/13)

### Appendix B – RegenOx and ORC Advanced Information

- ORC Advanced Pellets Product Sheet
- RegenOx Product Sheet
- ORC Advanced Product Sheet
- RegenOx Application Information
- ORC Advanced Application Information
- Case Study

# **APPENDIX A1**

HydroTech Environmental Corporation Phase II Tables and Figures  
dated October 2012

**Table 1**  
**Groundwater Monitoring Data - October 2012**  
**498 Leonard Street, Brooklyn, New York**

Well ID	Benchmark	Shot	DTP	DTW		Water Table Elevation (ft)
				Before	After	
MW-1	30	5.59	9	9.1	9.13	15.32
MW-2	30	5.55	ND	9.2	9.65	15.25
MW-3	30	5.48	ND	9.72	9.74	14.8
MW-4	30	5.72	ND	9.48	9.5	14.8
MW-5	30	5.61	ND	8.98	9.1	15.41
MW-6	30	6.26	ND	8.97	9.15	14.77
MW-7	30	5.26	ND	9.03	9.2	15.71
MW-8	30	5.45	ND	9.1	NA	15.45
MW-9	30	5.4	ND	9.75	NA	14.85
MW-10	30	5.41	ND	9.64	NA	14.95
MW-11	30	5.61	ND	9.53	NA	14.86
MW-12	30	5.4	ND	9.71	NA	14.89
MW-13	30	5.5	ND	9.68	NA	14.82

*All values reported in feet.*

*DTW...Depth to Water*

*DTP...Depth to Product*

*ND...None Detected*

*NA...Not Applicable*

Table 2  
Shallow Soil Samples Organic Analytical Results  
498 Leonard Street, Brooklyn, New York

Sample Identification	SP-5	SP-6	SP-7	SP-8	SP-9	SP-10	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8b) - Residential
Sample Depth	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/22/2012	-	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Volatile Organic Compounds (ug/kg)																
Benzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	3.61	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	60	2,900
Bromobenzene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
Bromochloromethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
Bromodichloromethane	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	NS	NS
Bromoform	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
Bromomethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
sec-Butylbenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	1.56	1.62	<1.25	2.98	NT	<1.25	5.02	<1.14	11,000	100,000
n-Butylbenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	1.19	<1.25	<1.09	NT	<1.25	<1.14	<1.14	12,000	100,000
tert-Butylbenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	1.27	<1.14	5,900	100,000
Carbon tetrachloride	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	760	1,400
Chlorobenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	1,100	100,000
Chloroethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
Chloroform	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	1.42	<1.25	<1.09	NT	<1.25	<1.14	<1.14	370	10,000
Chloromethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
2-Chlorotoluene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
4-Chlorotoluene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
1,2-Dibromo-3-chloropropane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
Dibromochloromethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
1,2-Dibromoethane	<2.19	<2.15	<1.16	<1.09	<1.07	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
Dibromomethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
1,2-Dichlorobenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	1,100	100,000
1,3-Dichlorobenzene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	2,400	17,000
1,4-Dichlorobenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	1,800	10,000
Dichlorodifluoromethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
1,1-Dichloroethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	270	19,000
1,2-Dichloroethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	20	2,300
1,1-Dichloroethene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	330	100,000
cis-1,2-Dichloroethene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	250	59,000
trans-1,2-Dichloroethene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	190	100,000
1,3-Dichloropropane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
2,2-Dichloropropane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
1,2-Dichloropropane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
trans-1,3-Dichloropropene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
1,1-Dichloropropene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
cis-1,3-Dichloropropene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
Ethylbenzene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	2.5	<1.25	<1.09	NT	<1.25	<1.14	<1.14	1,000	30,000
Hexachlorobutadiene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
Isopropylbenzene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
4-Isopropyltoluene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	7.93	<1.25	<1.09	NT	<1.25	3.91	<1.14	NS	NS
Methyl-Tert-Butyl-Ether	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	930	62,000
Methylene chloride	<11.0	<10.8	<11.6	<10.9	<10.7	NT	<11.1	26.4	<12.5	20.5	NT	<12.5	14.6	<11.4	50	51,000
n-Propylbenzene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	4.52	<2.51	<2.19	NT	<2.51	<2.28	<2.28	3,900	100,000
Styrene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<2.28	NS	NS
1,1,2,2-Tetrachloroethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
1,1,1,2-Tetrachloroethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
Tetrachloroethene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	1,300	5,500
Toluene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	1.86	1.26	<1.25	<1.09	NT	<1.25	1.16	<1.14	700	100,000
1,2,3-Trichlorobenzene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<1.14	NS	NS
1,1,1-Trichloroethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	680	100,000
1,1,2-Trichloroethane	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	NS	NS
Trichloroethene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	470	10,000
Trichlorofluoromethane	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	<1.10	<1.25	<1.09	NT	<1.25	<1.14	<1.14	NS	NS
1,2,3-Trichloropropane	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	NS	NS
1,2,4-Trimethylbenzene	1.76	<1.08	<1.16	<1.09	<1.07	NT	2.07	162	<1.25	<1.09	NT	<1.25	5.19	<1.14	3,600	47,000
1,3,5-Trimethylbenzene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	97.3	<2.51	<2.19	NT	<2.51	21.1	<2.28	8,400	47,000
Vinyl chloride	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	<2.21	<2.51	<2.19	NT	<2.51	<2.28	<2.28	20	210
m + p-Xylene	<2.19	<2.15	<2.32	<2.19	<2.14	NT	<2.21	25.5	<2.51	<2.19	NT	<1.25	<2.28	<2.28	260	100,000
o-Xylene	<1.10	<1.08	<1.16	<1.09	<1.07	NT	<1.11	2.57	<1.25	<1.09	NT	<2.51	1.29	<1.14	260	100,000
Total VOCs	1.76	ND	ND	ND	ND	NT	9.1	334.21	ND							

Sample Identification	SP-5	SP-6	SP-7	SP-8	SP-9	SP-10	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR PL.375-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR PL.375-6.8b) - Residential
Sample Depth	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/22/2012	-	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Semi-Volatile Organic Compounds (µg/kg)																
Acenaphthene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	20,000	100,000
Acenaphthylene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	100,000	100,000
Anthracene	<274	<269	<290	<273	<267	NT	318	<276	<314	<273	NT	<314	<284	<285	100,000	100,000
Benzo (a) Anthracene	<274	<269	1170	<273	<267	NT	532	<276	813	<273	NT	<314	<284	340	1,000	1,000
Benzo (a) Pyrene	<274	<269	1100	<273	<267	NT	419	<276	952	<273	NT	<314	<284	398	1,000	1,000
Benzo (b) Fluoranthene	<274	<269	1370	<273	<267	NT	477	<276	1250	<273	NT	<314	<284	450	1,000	1,000
Benzo (g,h,i) Perylene	<274	400	943	350	382	NT	<277	<276	493	<273	NT	<314	<284	320	100,000	100,000
Benzo (k) Fluoranthene	<274	<269	683	<273	<267	NT	<277	<276	471	<273	NT	<314	<284	<285	800	1,000
4-Bromophenyl Phenyl Ether	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Benzyl Butyl Phthalate	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
4-Chloroaniline	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
bis (2-Chloroethoxy) Methane	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
bis (2-Chloroethyl) Ether	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
bis (2-Chloroisopropyl) Ether	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
2-Chloronaphthalene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
4-Chlorophenyl Phenyl Ether	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Chrysene	<274	<269	1440	<273	<267	NT	522	<276	863	<273	NT	<314	<284	328	1,000	1,000
Dibenzo (a,h) Anthracene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	330	330
Dibenzofuran	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Di-n-Butyl Phthalate	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
2,4-Dimethylphenol	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
1,2-Dichlorobenzene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
1,4-Dichlorobenzene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
1,3-Dichlorobenzene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
3,3'-Dichlorobenzidine	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Diethyl Phthalate	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Dimethyl Phthalate	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
2,4-Dinitrotoluene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
2,6-Dinitrotoluene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
D-n-n-octyl Phthalate	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
bis (2-Ethyl Hexyl) Phthalate	<329	<323	<348	<328	<321	NT	<332	<331	<376	<273	NT	1240	<341	<342	NS	NS
Fluoranthene	<274	<269	2190	<273	449	NT	1060	<276	670	<273	NT	<314	<284	578	100,000	100,000
Fluorene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	30,000	100,000
Hexachlorobenzene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Hexachlorobudadiene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Hexachlorocyclopentadiene	<548	<538	<580	<546	<534	NT	<554	<552	<627	<546	NT	<627	<569	<571	NS	NS
Hexachloroethane	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Indeno (1,2,3-cd) Pyrene	<274	409	858	386	411	NT	<277	<276	483	<273	NT	<314	<284	<285	500	500
Isophorone	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
2-Methylnaphthalene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Naphthalene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	12,000	100,000
3-Nitroaniline	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
2-Nitroaniline	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
4-Nitroaniline	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Nitrobenzene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
N-Nitrosodiphenylamine	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
n-Nitrosodi-n-propylamine	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
Phenanthrene	<274	<269	1140	<273	287	NT	1260	<276	<314	<273	NT	<314	<284	353	100,000	100,000
Pyrene	<274	<269	2380	<273	405	NT	1030	<276	695	<273	NT	<314	<284	548	100,000	100,000
1,2,4-Trichlorobenzene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS

Sample Identification	SP-5	SP-6	SP-7	SP-8	SP-9	SP-10	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8b) - Residential
Sample Depth	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/22/2012	-	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
<b>Pesticides</b>																
a BHC	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	20	97
Chlordane (alpha)	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<b>13.8</b>	<b>25.6</b>	<5.71	94	910
b BHC	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	36	72
Aldrin	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	5	19
gamma-BHC	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	NS	NS
Gama Chlordane	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<b>17.3</b>	<b>27.8</b>	<5.71	NS	NS
Heptachlor	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	420	420
Heptachlor Epoxide	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<b>7.47</b>	<b>8.6</b>	<5.71	NS	NS
d BHC	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	40	100,000
Endosulfan I	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	2,400	4,800
Endosulfan II	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	2,400	4,800
Endosulfan Sulfate	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	2,400	4,800
Endrin	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	14	2,200
Endrin Aldehyde	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	NS	NS
Endrin ketone	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	NS	NS
p,p-DDD	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<b>16.6</b>	<6.27	<5.46	NT	<b>816</b>	<b>329</b>	<b>8.31</b>	3.3	2,600
p,p-DDE	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<b>7.01</b>	<6.27	<5.46	NT	<b>28.5</b>	<b>35.2</b>	<5.71	3.3	1,800
p,p-DDT	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<b>80.7</b>	<b>9.12</b>	<5.71	3.3	1,700
Methoxychlor	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<6.27	<5.69	<5.71	NS	NS
Dieldrin	<5.48	<5.38	<5.80	<5.46	<5.34	NT	<5.54	<5.52	<6.27	<5.46	NT	<b>255</b>	<5.69	<5.71	5	39
Chlordane (technical)	<54.8	<53.8	<58.0	<54.6	<53.4	NT	<55.4	<55.2	<62.7	<54.6	NT	<b>67.5</b>	<b>106</b>	<57.1	NS	NS
Toxaphene	<274	<269	<290	<273	<267	NT	<277	<276	<314	<273	NT	<314	<284	<285	NS	NS
<b>PCBs</b>																
Aroclor 1016	<71.3	<70.0	<75.4	<71.0	<69.4	NT	<72.0	<71.8	<81.6	<71	NT	<81.6	<73.9	<74.2	NS	NS
Aroclor 1221	<110	<108	<116	<109	<107	NT	<111	<110	<125	<109	NT	<125	<114	<114	NS	NS
Aroclor 1232	<78.9	<77.5	<83.5	<78.7	<76.9	NT	<79.7	<79.6	<90.3	<78.7	NT	<90.3	<81.9	<82.2	NS	NS
Aroclor 1242	<110	<108	<116	<109	<107	NT	<111	<110	<125	<109	NT	<125	<114	<114	NS	NS
Aroclor 1248	<65.8	<64.6	<69.6	<65.6	<64.1	NT	<66.4	<66.3	<75.3	<65.6	NT	<75.3	<68.3	<68.5	NS	NS
Aroclor 1254	<32.9	<32.3	<34.8	<32.8	<32.1	NT	<33.2	<33.1	<37.6	<32.8	NT	<37.6	<34.1	<34.2	NS	NS
Aroclor 1260	<110	<108	<116	<109	<107	NT	<111	<110	<125	<109	NT	<125	<114	<114	NS	NS

NS...No Standard

ND...Not Detected

NT...Not Tested

ug/kg...micrograms per kilogram

Gray shaded values represent concentration exceeding Track 1 SCO

Orange shaded values represent concentration exceeding Track 2 SCO

**Table 3**  
**Deep Soil Samples Organic Analytical Results**  
**498 Leonard Street, Brooklyn, New York**

Sample Identification	SP-5	SP-6	SP-7	SP-7	SP-8	SP-9	SP-10	SP-11	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8b) - Residential
Sample Depth	10'-12'	10'-12'	6'-8'	10'-12'	10'-12'	10'-12'	10'-12'	6'-8'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/2/2012	10/22/2012	10/4/2012	10/18/2012	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg		
Volatile Organic Compounds (µg/kg)																		
Benzene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	60	2,900
Bromobenzene	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
Bromochloromethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
Bromodichloromethane	<78.7	<15.0	<68.0	<60.3	<7.60	<1280	<63.9	<1200	<1260	<1200	<1680	<1520	NT	<1860	<1180	<1220	NS	NS
Bromoform	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
Bromomethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
sec-Butylbenzene	2480	117	<13.6	<12.1	5.80	2410	1190	2990	30900	48500	31900	26700	NT	16400	52100	47900	11,000	100,000
n-Butylbenzene	920	55.7	<13.6	957	<1.52	3520	519	812	8150	36500	13600	7410	NT	3910	33400	20700	12,000	100,000
tert-Butylbenzene	<31.5	24.8	<13.6	<12.1	<1.52	<256	<12.8	743	13600	7720	9910	15300	NT	4520	11600	13000	5,900	100,000
Carbon tetrachloride	<15.7	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	760	1,400
Chlorobenzene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	1,100	100,000
Chloroethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
Chloroform	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	370	10,000
Chloromethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
2-Chlorotoluene	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
4-Chlorotoluene	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
1,2-Dibromo-3-chloropropane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
Dibromochloromethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
1,2-Dibromomethane	<31.5	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
Dibromomethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
1,2-Dichlorobenzene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	1,100	100,000
1,3-Dichlorobenzene	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	2,400	17,000
1,4-Dichlorobenzene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	1,800	10,000
Dichlorodifluoromethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
1,1-Dichloroethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	270	19,000
1,2-Dichloroethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	20	2,300
1,1-Dichloroethene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	330	100,000
cis-1,2-Dichloroethene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	250	59,000
trans-1,2-Dichloroethene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	190	100,000
1,2-Dichloropropane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
2,2-Dichloropropane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
1,2-Dichloropropane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
trans-1,3-Dichloropropene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
1,1-Dichloropropene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
cis-1,3-Dichloropropene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
Ethylbenzene	70.0	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	1,000	30,000
Hexachlorobutadiene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
Isopropylbenzene	1050	15.0	248	630	<3.04	1370	200	<479	1270	29600	1100	655	NT	<743	21200	2560	NS	NS
4-Isopropyltoluene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
Methyl-Tert-Butyl-Ether	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	930	62,000
Methylene chloride	<15.7	<2.99	<13.6	<12.1	<1.52	<2560	<128	<2400	<2520	<2390	<3350	<3050	NT	<3720	<2370	<2440	50	51,000
n-Propylbenzene	1110	29.9	<27.2	<24.1	<3.04	3430	242	<479	<504	57100	<670	<610	NT	<743	25300	<489	3,900	100,000
Styrene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
1,1,2,2-Tetrachloroethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
1,1,1,2-Tetrachloroethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
Tetrachloroethene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	1,300	5,500
Toluene	<15.7	<2.99	<13.6	12.5	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	700	100,000
1,2,3-Trichlorobenzene	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
1,1,1-Trichloroethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	680	100,000
1,1,2-Trichloroethane	<31.5	<5.98	<27.2	<24.1	<3.04	<512	<25.6	<479	<504	<478	<670	<610	NT	<743	<474	<489	NS	NS
Trichloroethene	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	470	10,000
Trichlorofluoromethane	<15.7	<2.99	<13.6	<12.1	<1.52	<256	<12.8	<240	<252	<239	<335	<305	NT	<372	<237	<244	NS	NS
1,2,3-Trichloropropane	<78.7	<15.0	<68.0	<60.3	<7.60	<1280	<63.											

Sample Identification	SP-5	SP-6	SP-7	SP-7	SP-8	SP-9	SP-10	SP-11	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.575-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.575-6.8b) Residential
Sample Depth	10'-12'	10'-12'	6'-8'	10'-12'	10'-12'	10'12'	10'-12'	6'-8'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/2/2012	10/22/2012	10/4/2012	10/18/2012	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Semi-Volatile Organic Compounds (ug/kg)																		
Acenaphthene	1530	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	1270	<306	20,000	100,000
Acenaphthylene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	100,000	100,000
Anthracene	1400	<307	<344	<303	<380	343	<321	<299	<315	<299	<419	<381	NT	<465	1330	<306	100,000	100,000
Benzo (a) Anthracene	<397	1870	448	1320	<380	362	<321	481	<315	<299	<419	503	NT	734	1830	<306	1,000	1,000
Benzo (a) Pyrene	<397	2310	408	1490	<380	331	<321	862	<315	<299	<419	651	NT	604	1230	<306	1,000	1,000
Benzo (b) Fluoranthene	<397	2210	547	1510	<380	344	<321	819	<315	322	<419	636	NT	760	1500	<306	1,000	1,000
Benzo (g,h,i) Perylene	463	1440	533	1120	<380	522	<321	886	<315	<299	575	619	NT	<465	549	<306	100,000	100,000
Benzo (k) Fluoranthene	<397	1350	<344	795	<380	<320	<321	511	<315	<299	<419	<381	NT	<465	704	<306	800	1,000
4-Bromophenyl Phenyl Ether	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Benzyl Butyl Phthalate	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
4-Chloroaniline	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
bis (2-Chloroethoxy) Methane	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
bis (2-Chloroethyl) Ether	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
bis (2-Chloroisopropyl) Ether	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
2-Chloronaphthalene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
4-Chlorophenyl Phenyl Ether	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Chrysene	<397	1850	482	1550	<380	375	<321	510	<315	<299	<419	514	NT	714	1710	<306	1,000	1,000
Dibenzo (a,h) Anthracene	<397	803	<344	959	<380	<320	<321	565	<315	<299	<419	<381	NT	<465	<296	<306	330	330
Dibenzofuran	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Di-n-Butyl Phthalate	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
2,4-Dimethylphenol	1060	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
1,2-Dichlorobenzene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
1,4-Dichlorobenzene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
1,3-Dichlorobenzene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
3,3'-Dichlorobenzidine	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Diethyl Phthalate	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Dimethyl Phthalate	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
2,4-Dinitrotoluene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
2,6-Dinitrotoluene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
D-n-octyl Phthalate	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
bis (2-Ethyl Hexyl) Phthalate	<397	<369	<413	<364	<456	<384	<385	<359	<378	<359	<503	<457	NT	<538	425	<367	NS	NS
Fluoranthene	946	1270	1040	1790	<380	954	497	352	<315	334	424	<381	NT	2170	5350	<306	100,000	100,000
Fluorene	4030	462	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	494	1280	<306	30,000	100,000
Hexachlorobenzene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Hexachlorobutadiene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Hexachlorocyclopentadiene	<397	<614	<344	<303	<760	<639	<642	<599	<631	<598	<838	<762	NT	<929	<592	<611	NS	NS
Hexachloroethane	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Indeno (1,2,3-cd) Pyrene	519	1450	584	1100	<380	529	<321	830	<315	<299	606	422	NT	<465	558	<306	500	500
Isophorone	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
2-Methylnaphthalene	16600	<307	<344	<303	<380	<320	<321	<299	<315	627	<419	<381	NT	<465	<296	<306	NS	NS
Naphthalene	<397	528	<344	<303	<380	<320	<321	<299	<315	868	<419	<381	NT	<465	<296	<306	12,000	100,000
3-Nitroaniline	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
2-Nitroaniline	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
4-Nitroaniline	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Nitrobenzene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
N-Nitrosodiphenylamine	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
n-Nitrosodi-n-propylamine	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
Phenanthrene	8210	1090	<344	362	<380	1010	<321	<299	<315	<299	<419	<381	NT	1970	6210	<306	100,000	100,000
Pyrene	1620	1400	1040	1720	<380	877	576	393	<315	319	466	957	NT	1820	4770	<306	100,000	100,000
1,2,4-Trichlorobenzene	<397	<307	<344	<303	<380	<320	<321	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS

Sample Identification	SP-5	SP-6	SP-7	SP-7	SP-8	SP-9	SP-10	SP-11	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.575-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.575-6.8b) Residential
Sample Depth	10'-12'	10'-12'	6'-8'	10'-12'	10'-12'	10'12'	10'-12'	6'-8'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/2/2012	10/22/2012	10/4/2012	10/18/2012	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	-	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
<b>Pesticides</b>																		
a BHC	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	20	97
Chlordane (alpha)	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	94	910
b BHC	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	36	72
Aldrin	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	5	19
gamma-BHC	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	NS	NS
Gama Chlordane	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	NS	NS
Heptachlor	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	420	420
Heptachlor Epoxide	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	NS	NS
d BHC	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	40	100,000
Endosulfan I	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	2,400	4,800
Endosulfan II	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	2,400	4,800
Endosulfan Sulfate	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	2,400	4,800
Endrin	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	14	2,200
Endrin Aldehyde	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	NS	NS
Endrin ketone	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	NS	NS
p,p-DDD	<7.94	10.4	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	7.87	<8.38	8.86	NT	<9.29	37.8	<6.11	3.3	2,600
p,p-DDE	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	6.93	9.79	8.11	16.3	13	NT	<9.29	8.71	<6.11	3.3	1,800
p,p-DDT	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	3.3	1,700
Methoxychlor	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	NS	NS
Dieldrin	<7.94	<614	NT	<6.06	<7.60	<6.39	NT	<5.99	<6.31	<5.98	<8.38	<7.62	NT	<9.29	<5.92	<6.11	5	39
Chlordane (technical)	<79.4	<61.4	NT	<60.6	<76.0	<63.9	NT	<59.9	<63.1	<59.8	<83.8	<76.2	NT	<92.9	<59.2	<61.1	NS	NS
Toxaphene	<397	<307	NT	<303	<380	<320	NT	<299	<315	<299	<419	<381	NT	<465	<296	<306	NS	NS
<b>PCBs</b>																		
Aroclor 1016	<103	<79	NT	<78.8	<98.8	<83.1	NT	<77.8	<82.0	<77.8	<109	<99.1	NT	<121	<77	<79.5	NS	NS
Aroclor 1221	<159	<123	NT	<121	<152	<128	NT	<120	<126	<120	<168	<152	NT	<186	<118	<122	NS	NS
Aroclor 1232	<114	<88.5	NT	<87.3	<109	<92.1	NT	<86.2	<90.8	<86.1	<121	<110	NT	<134	<85.3	<88	NS	NS
Aroclor 1242	<159	<123	NT	<121	<152	<128	NT	<120	<126	<120	<168	<152	NT	<186	<118	<122	NS	NS
Aroclor 1248	<95.2	<73.7	NT	<72.7	<91.2	<76.7	NT	<71.9	<75.7	<71.8	<101	<91.5	NT	<112	<71.1	<73.3	NS	NS
Aroclor 1254	<47.6	<36.9	NT	<36.4	<45.6	<38.4	NT	<35.9	<37.8	<35.9	<50.3	<45.7	NT	<55.8	<35.5	<36.7	NS	NS
Aroclor 1260	<159	<123	NT	<121	<152	<128	NT	<120	<126	<120	<168	<152	NT	<186	<118	<122	NS	NS

NS...No Standard

ND...Not Detected

NT...Not Tested

ug/kg...micrograms per kilogram

Gray shaded values represent concentration exceeding Track 1 SCO

Orange shaded values represent concentration exceeding Track 2 SCO

**Table 4**  
**Shallow Soil Samples Inorganic Analytical Results**  
**498 Leonard Street, Brooklyn, New York**

Sample Identification	SP-5	SP-6	SP-7	SP-8	SP-9	SP-10	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8b) - Residential
Sample Depth	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/22/2012	-	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	-	mg/Kg	mg/Kg	mg/Kg	mg/Kg	-	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	14000	2970	6450	13100	5790	NT	2180	4080	6930	3480	NT	6170	5650	4320	NS	NS
Chromium Trivalent	7.35	ND	43.9	ND	7.48	NT	<1.11	<1.10	10.3	<1.09	NT	7.68	<1.14	<1.14	30	36
Antimony	ND	ND	ND	5.09	<1.97	NT	<3.07	<3.10	<3.44	<3.03	NT	<2.93	<3.04	<3.09	NS	NS
Arsenic	ND	3.74	59	ND	<1.97	NT	14.5	7.37	<3.44	18.2	NT	15.1	<3.04	7.63	13	16
Barium	64.2	108	777	73	85.9	NT	99.1	141	79.9	183	NT	290	114	171	350	350
Beryllium	0.473	ND	0.361	0.51	0.276	NT	<0.307	<0.310	0.413	<0.303	NT	0.468	<0.304	<0.309	7.2	14
Cadmium	2.82	2.03	3.46	2.79	1.37	NT	4.02	6.85	1.87	3.88	NT	2.8	2.98	5	2.5	2.5
Calcium	1280	9700	20000	1350	8450	NT	6300	4710	1520	3460	NT	12100	1130	3670	NS	NS
Chromium	7.46	ND	ND	5.09	7.48	NT	<1.53	<1.55	10.3	<1.51	NT	7.68	<1.52	<1.54	NS	NS
Chromium Hexavalent	ND	ND	43.9	ND	<0.267	NT	<0.277	<0.276	<0.314	<0.257	NT	<0.314	<0.269	<0.255	1	22
Cobalt	9.85	4.94	10.6	9.71	5.95	NT	9.16	11.9	10.8	7.46	NT	7.89	10.3	11.6	NS	NS
Copper	22.9	39.1	148	28.4	46.2	NT	77.5	82.5	156	127	NT	211	59.9	177	50	270
Iron	24900	31400	48400	23800	13800	NT	88100	148000	20200	58500	NT	19500	55700	96400	NS	NS
Lead	16.3	320	2020	135	400	NT	523	626	590	1150	NT	806	188	919	63	400
Magnesium	3970	834	413	3800	1700	NT	519	901	2800	521	NT	1270	1440	891	NS	NS
Manganese	387	200	1970	46.3	205	NT	196	837	118	433	NT	260	366	457	1,600	2,000
Mercury	0.059	0.435	25.3	1.05	1.04	NT	0.189	0.368	0.064	0.078	NT	0.155	0.52	0.524	0.18	0.81
Nickel	25	10.2	21.2	27.2	13.8	NT	20.8	21.2	19.9	20.8	NT	14.7	11.7	23.7	30	140
Potassium	1970	634	1290	1700	919	NT	415	820	2480	518	NT	1020	752	487	NS	NS
Selenium	ND	ND	ND	ND	<0.986	NT	<1.53	<1.55	<1.72	<1.51	NT	<1.46	<1.52	<1.54	3.9	36
Silver	ND	ND	ND	ND	<0.986	NT	<1.53	<1.55	<1.72	<1.51	NT	<1.46	<1.52	<1.54	2	36
Sodium	128	182	443	119	336	NT	83.5	257	60.8	372	NT	786	90.2	148	NS	NS
Thallium	ND	ND	ND	ND	<1.97	NT	<3.07	<3.10	<3.44	<3.03	NT	<2.93	<3.04	<3.09	NS	NS
Vanadium	39.6	15.4	30.2	42	22.9	NT	18	37.4	45.8	21.9	NT	34.3	24.8	27.2	NS	NS
Zinc	296	538	500	290	113	NT	642	384	385	1400	NT	1040	132	1340	109	2,200

ND...not detected

NT...not tested

mg/kg...milligrams per kilogram

NS...no standard

Gray shaded values represent concentration exceeding Track 1 SCO

Orange shaded values represent concentration exceeding Track 2 SCO

**Table 5**  
**Deep Soil Samples Inorganic Analytical Results**  
**498 Leonard Street, Brooklyn, New York**

Sample Identification	SP-5	SP-6	SP-7	SP-7	SP-8	SP-9	SP-10	SP-11	SP-11	SP-12	SP-13	SP-14	SP-15	SP-16	SP-17	SP-18	Unrestricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8)	Restricted Use Soil Cleanup Objectives (6 NYC RR Pt.375-6.8b) - Residential
Sample Depth	10'-12'	10'-12'	6'-8'	10'-12'	10'-12'	10'-12'	10'-12'	6'-8'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'	10'-12'		
Sample Date	10/1/2012	10/1/2012	10/2/2012	10/2/2012	10/2/2012	10/22/2012	-	10/18/2012	10/18/2012	10/17/2012	10/18/2012	10/17/2012	-	10/18/2012	10/17/2012	10/17/2012		
Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil	Soil	Soil	-	Soil	Soil	Soil		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	-	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	-	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	17000	12500	NT	6660	9150	14100	NT	5500	2580	6550	4630	4570	NT	7570	4780	5080	NS	NS
Chromium Trivalent	11.1	ND	NT	82.4	ND	7.56	NT	5.27	<1.26	<1.20	9.13	<1.52	NT	<1.86	<1.18	<1.22	30	36
Antimony	ND	10.6	NT	3.8	ND	<2.32	NT	<3.19	<3.57	<2.92	<4.52	<4.19	NT	<4.52	<3.11	<3.24	NS	NS
Arsenic	41.5	ND	NT	16.1	4.41	<2.32	NT	9.6	10.6	<2.92	40.6	34.8	NT	16.3	<3.11	<3.24	13	16
Barium	451	85.9	NT	818	125	99.4	NT	144	158	59.2	879	176	NT	234	60.3	74.8	350	350
Beryllium	0.974	0.45	NT	0.455	0.586	0.481	NT	0.351	<0.357	0.416	<0.452	<0.419	NT	<0.452	0.318	<0.324	7.2	14
Cadmium	2.8	2.59	NT	1.64	2.43	2.85	NT	1.65	2.88	2.28	<2.26	3.75	NT	3.11	2.1	1.81	2.5	2.5
Calcium	8310	2760	NT	11100	8390	11800	NT	2790	10400	2330	26700	14600	NT	15400	5890	8030	NS	NS
Chromium	11.1	10.6	NT	82.4	ND	7.56	NT	5.27	<1.78	<1.46	9.13	<2.10	NT	<2.26	<1.55	<1.62	NS	NS
Chromium Hexavalent	ND	ND	NT	ND	ND	<0.320	NT	<0.282	<0.300	<0.272	<0.377	<0.381	NT	<0.425	<0.280	<0.306	1	22
Cobalt	13.2	8.16	NT	8.74	11	8.5	NT	9.05	8.53	8.83	7.29	9.87	NT	8.96	10.3	9.57	NS	NS
Copper	51.4	27.7	NT	113	283	29.4	NT	34.7	73.6	46.2	407	120	NT	88.9	19.6	25.5	50	270
Iron	24100	25700	NT	13100	20900	25000	NT	21900	62800	36500	25400	71000	NT	44600	37000	29500	NS	NS
Lead	283	39.1	NT	1650	5730	373	NT	247	467	136	2660	3000	NT	527	26.2	83.5	63	400
Magnesium	819	3190	NT	1210	625	2870	NT	3010	1220	3090	1500	1150	NT	2900	3810	4780	NS	NS
Manganese	106	308	NT	183	223	347	NT	121	143	311	283	613	NT	823	565	275	1,600	2,000
Mercury	5.12	2.1	NT	2.67	0.667	1.35	NT	0.088	0.077	0.134	0.078	0.207	NT	0.166	0.081	0.317	0.18	0.81
Nickel	27.6	14.8	NT	17.4	23.2	13.5	NT	13.2	18.6	12.8	13	20.6	NT	17.9	14.3	15.4	30	140
Potassium	3380	2490	NT	818	846	1120	NT	1790	493	2430	844	933	NT	1250	1880	1770	NS	NS
Selenium	ND	ND	NT	2.66	ND	<1.16	NT	<1.60	<1.78	<1.46	<2.26	<2.10	NT	<2.26	<1.55	<1.62	3.9	36
Silver	ND	ND	NT	ND	ND	<1.16	NT	<1.60	<1.78	<1.46	<2.26	<2.10	NT	<2.26	<1.55	<1.62	2	36
Sodium	597	94.1	NT	299	336	453	NT	73.8	146	76.5	410	483	NT	408	163	86.3	NS	NS
Thallium	ND	ND	NT	ND	ND	<2.32	NT	<3.19	<3.57	<2.92	<4.52	<4.19	NT	<4.52	<3.11	<3.24	NS	NS
Vanadium	50.2	42	NT	28.5	48.2	45.9	NT	34.3	27.5	41.9	36.4	33.6	NT	29.5	36.5	32	NS	NS
Zinc	166	80.5	NT	379	619	96.4	NT	269	141	105	2080	664	NT	346	68.9	103	109	2,200

ND...not detected

mg/kg...milligrams per kilogram

NS...no standard

NT...not tested

Gray shaded values represent concentration exceeding Track 1 SCO

Orange shaded values represent concentration exceeding Track 2 SCO

Table 6  
Groundwater Samples Organic Analytical Results  
498 Leonard Street, Brooklyn, New York

Sample Identification	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	Field Blank	Trip Blank	NYSDEC TOCS 1.1.1 Groundwater Quality Standard
Sample Date	10/2/2012	10/2/2012	10/4/2012	10/4/2012	10/8/2012	10/8/2012	10/23/2012	-	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	
Sample Matrix	Groundwater	Water	Water													
Units	ug/L	ug/L	ug/L													
Volatile Organic Compounds																
Benzene	12.6	<1.00	<5.00	<5.00	<1.00	<1.00	79.2	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	1
Bromobenzene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Bromochloromethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Bromodichloromethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Bromoform	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Bromomethane	<2.00	<2.00	<5.00	<5.00	<2.00	<2.00	<10.0	NT	<10.0	<10.0	<10.0	<10.0	<10.0	<2.00	<2.00	NS
sec-Butylbenzene	23.8	40.3	53.3	41.2	41.2	24.1	25.5	NT	24.2	100	206	544	389	<1.00	<1.00	5
n-Butylbenzene	11.2	14.4	15.8	7.40	8.57	2.81	31.6	NT	<5.00	53.0	53.2	350	194	<1.00	<1.00	5
tert-Butylbenzene	4.10	12.0	15.4	13.0	13.3	9.56	<5.00	NT	12.60	27.6	65.0	105	106	<1.00	<1.00	5
Carbon tetrachloride	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Chlorobenzene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Chloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Chloroform	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	7
Chloromethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	NS
2-Chlorotoluene	<2.00	<2.00	<10.0	<10.0	<2.00	<2.00	<10.0	NT	<10.0	<10.0	<10.0	<10.0	<10.0	<2.00	<2.00	5
4-Chlorotoluene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,2-Dibromo-3-chloropropane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	0.04
Dibromochloromethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,2-Dibromothane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	0.0006
Dibromomethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,2-Dichlorobenzene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	3
1,3-Dichlorobenzene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	3
1,4-Dichlorobenzene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	3
Dichlorodifluoromethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,1-Dichloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,2-Dichloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,1-Dichloroethene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
cis-1,2-Dichloroethene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
trans-1,2-Dichloroethene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,3-Dichloropropane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
2,2-Dichloropropane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,2-Dichloropropane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	1
trans-1,3-Dichloropropene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	0.4
1,1-Dichloropropene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
cis-1,3-Dichloropropene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	0.4
Ethylbenzene	51.3	<1.00	<5.00	<5.00	<1.00	<1.00	11.8	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Hexachlorobutadiene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	0.5
Isopropylbenzene	25.8	9.90	8.10	<5.00	6.25	<1.00	11.8	NT	<5.00	35.4	6.90	307	35.5	<1.00	<1.00	5
4-Isopropyltoluene	2.45	<1.00	27.8	12.2	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Methyl-4-butyl ether	16.2	7.01	<5.00	<5.00	5.74	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	10
Methylene chloride	<10.0	<10.0	<5.00	<5.00	<10.0	<10.0	<50.0	NT	<50.0	<50.0	<50.0	<50.0	<50.0	<10.0	<10.0	5
n-Propylbenzene	50.5	15.8	6.10	<5.00	15.6	<1.00	174	NT	<5.00	42.4	<5.00	346	<5.00	<1.00	<1.00	NS
Styrene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,1,2,2-Tetrachloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,1,1,2-Tetrachloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Tetrachloroethene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Toluene	1.24	<1.00	<5.00	<5.00	<1.00	<1.00	7.85	NT	<5.00	<5.00	<5.00	<5.00	<5.00	1.04	1.13	5
1,2,4-Trichlorobenzene	<2.00	<2.00	<5.00	<5.00	<2.00	<2.00	<10.0	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<2.00	<2.00	5
1,2,3-Trichlorobenzene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<10.0	<10.0	<10.0	<10.0	<10.0	<1.00	<1.00	5
1,1,1-Trichloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,1,2-Trichloroethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	NA	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	1
Trichloroethene	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Trichlorofluoromethane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,2,3-Trichloropropane	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	0.04
1,2,4-Trimethylbenzene	30.8	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
1,3,5-Trimethylbenzene	7.25	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	5
Vinyl chloride	<1.00	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.00	<1.00	<1.00	2
o-Xylene	12.6	<1.00	<5.00	<5.00	<1.00	<1.00	<5.00	NT	<5.00	<5.00	<5.00	<5.00	<5.			

Sample Identification	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	Field Blank	Trip Blank	NYSDEC TOGS 1.1.1
Sample Date	10/2/2012	10/2/2012	10/4/2012	10/4/2012	10/8/2012	10/8/2012	10/23/2012	-	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	Groundwater
Sample Matrix	Groundwater	Water	Water	Groundwater												
Units	ug/L	ug/L	ug/L													
Semivolatile Organic Compounds																
Acenaphthene	62.2	156	<3.00	3.37	<3.00	<3.00	5.45	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	20
Acenaphthylene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Anthracene	28.0	<3.00	<3.00	3.05	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	50
Benzo(a)anthracene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Benzo(a)pyrene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Benzo(b)fluoranthene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	0.002
Benzo(g,h,i)perylene	<15.0	<3.00	<3.00	<3.00	3.35	3.50	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Benzo(k)fluoranthene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	0.002
4-Bromophenyl phenyl ether	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	0.04
Butyl benzyl phthalate	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	50
4-Chloroaniline	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	5
bis(2-Chloroethoxy)methane	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	NS
bis(2-Chloroethyl)ether	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	NS
bis(2-Chloroisopropyl)ether	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	NS
2-Chloronaphthalene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	10
4-Chlorophenol phenyl ether	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<4.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Chrysene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	0.002
Dibenz(a,h)anthracene	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Dibenzofuran	<15.0	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<3.00	<3.00	NT	NS
Di-n-butylphthalate	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	50
1,2-Dichlorobenzene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	NS
1,4-Dichlorobenzene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	NS
1,3-Dichlorobenzene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	NS
3,3'-Dichlorobenzidine	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	5
Diethyl phthalate	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	50
Dimethyl phthalate	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	5
2,4-Dinitrotoluene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	5
2,6-Dinitrotoluene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	5
Di-n-octylphthalate	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<3.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	50
bis(2-Ethylhexyl)phthalate	<15.0	40.3	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	5
Fluoranthene	63.1	59.9	<3.00	4.65	<3.00	<3.00	3.01	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	50
Fluorene	92.2	240	<3.00	4.17	<3.00	<3.00	3.76	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	50
Hexachlorobenzene	<25.0	<50.0	<5.00	<5.00	<5.00	<5.00	<5.00	NT	<5.00	<5.00	<5.00	<25.0	<50.0	<5.00	NT	0.04
Hexachlorobutadiene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	NS
Hexachlorocyclopentadiene	<30.0	<60.0	<6.00	<6.00	<6.00	<6.00	<6.00	NT	<6.00	<6.00	<6.00	<30.0	<60.0	<6.00	NT	5
Hexachloroethane	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	5
Indeno(1,2,3-cd)pyrene	<10.0	<20.0	<2.00	<2.00	2.34	2.36	<2.00	NT	<2.00	<2.00	<2.00	<10.0	<20.0	<2.00	NT	0.002
Isophorone	<10.0	<20.0	<2.00	<2.00	<2.00	<2.00	<2.00	NT	<2.00	<2.00	<2.00	<10.0	<20.0	<2.00	NT	50
2-Methylnaphthalene	305	<30.0	<3.00	<3.00	<3.00	<3.00	4.19	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	NS
Naphthalene	63.0	<40.0	<4.00	11.4	<4.00	<4.00	22.5	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	10
3-Nitroaniline	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	5
2-Nitroaniline	<20.0	<40.0	<4.00	<4.00	<4.00	<4.00	<4.00	NT	<4.00	<4.00	<4.00	<20.0	<40.0	<4.00	NT	5
4-Nitroaniline	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	5
Nitrobenzene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	0.4
N-Nitrosodiphenylamine	<25.0	<50.0	<5.00	<5.00	<5.00	<5.00	<5.00	NT	<5.00	<5.00	<5.00	<25.0	<50.0	<5.00	NT	50
N-Nitrosodi-n-propylamine	<25.0	<50.0	<5.00	<5.00	<5.00	<5.00	<5.00	NT	<5.00	<5.00	<5.00	<25.0	<50.0	<5.00	NT	NS
Phenanthrene	226	503	<3.00	12.7	<3.00	<3.00	9.31	NT	<3.00	7.87	<3.00	<15.0	<30.0	<3.00	NT	50
Pyrene	68.2	84.1	<3.00	4.07	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	50
1,2,4-Trichlorobenzene	<15.0	<30.0	<3.00	<3.00	<3.00	<3.00	<3.00	NT	<3.00	<3.00	<3.00	<15.0	<30.0	<3.00	NT	NS

Sample Identification	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	Field Blank	Trip Blank	NYSDEC TOGS 1.1.1 Groundwater Quality Standard
Sample Date	10/2/2012	10/2/2012	10/4/2012	10/4/2012	10/8/2012	10/8/2012	10/23/2012	-	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	
Sample Matrix	Groundwater	Water	Water													
Units	ug/L	ug/L	ug/L													
Pesticides																
a BHC	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Alachlor	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	0.5							
b BHC	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Aldrin	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Lindane	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Chlordane	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	0.05							
Heptachlor	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	0.04							
Heptachlor Epoxide	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	0.03							
d BHC	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Endosulfan I	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Endosulfan II	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Endosulfan Sulfate	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Endrin	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	NS							
Endrin Aldehyde	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	5							
Endrin Ketone	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	5							
4,4-DDD	NT	<0.05	<0.05	<b>0.12</b>	<b>0.29</b>	<b>0.17</b>	<0.05	NT	0.3							
p,p-DDE	NT	<0.05	<0.05	<0.05	<b>0.11</b>	<b>0.13</b>	<0.05	NT	0.2							
p,p-DDT	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	0.2							
Methoxychlor	NT	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NT	35							
Dieldrin	NT	<0.05	<0.05	<b>0.05</b>	<0.05	<0.05	<0.05	NT	0.004							
Chlordane (technical)	NT	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NT	NS							
Toxaphene	NT	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	NT	NS							
PCBs																
Aroclor 1016	NT	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NT	0.09							
Aroclor 1221	NT	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NT	0.09							
Aroclor 1232	NT	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NT	0.09							
Aroclor 1242	NT	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NT	0.09							
Aroclor 1248	NT	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NT	0.09							
Aroclor 1254	NT	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NT	0.09							
Aroclor 1260	NT	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NT	0.09							

NS...No Standard

ug/L...micrograms per Liter

ND...not detected

NT...not tested

Shaded values represent concentration exceeding the GQS

**Table 7**  
**Groundwater Samples Inorganic Analytical Results**  
**498 Leonard Street, Brooklyn, New York**

Sample Identification	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	Field Blank	NYSDEC TOGS 1.1.1 Groundwater Quality Standard
Sample Date	-	-	-	-	-	-	-	-	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	10/19/2012	
Sample Matrix	-	-	-	-	-	-	-	-	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Water	
Units	-	-	-	-	-	-	-	-	mg/L						
<b>Total Metals</b>															
Aluminum	NT	37.9	44.5	82.7	90.7	160	<0.040	NS							
Antimony	NT	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.003							
Arsenic	NT	0.097	1.16	0.183	0.141	0.991	<0.040	0.025							
Barium	NT	1.89	1.74	5.16	4.26	11.9	<0.040	1							
Beryllium	NT	<0.004	<0.004	0.006	0.007	0.012	<0.040	0.003							
Cadmium	NT	<0.020	<0.020	0.024	0.021	0.045	<0.020	0.005							
Calcium	NT	277	260	254	314	330	0.055	NS							
Chromium	NT	0.123	0.063	0.126	0.122	0.71	<0.020	0.05							
Chromium Hexavalent	NT	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05							
Trivalent Chromium	NT	0.123	0.063	0.126	0.122	0.71	<0.050	0.05							
Cobalt	NT	0.049	0.039	0.075	0.079	0.172	<0.008	NS							
Copper	NT	0.723	0.425	0.881	1.12	2.54	<0.004	0.2							
Iron	NT	125	77.9	157	179	402	<0.040	0.3							
Lead	NT	4.99	5.04	8.71	9.09	51.3	<0.040	0.025							
Magnesium	NT	36.3	28.8	27.6	27.6	35.4	<0.040	35							
Manganese	NT	2.74	1.7	13.3	3.2	5.06	<0.004	0.30							
Mercury	NT	0.187	172	0.0872	0.0694	0.852	<0.0003	0.0007							
Nickel	NT	0.114	0.103	0.164	0.168	0.391	<0.010	0.1							
Potassium	NT	26.9	38.1	35.4	26.2	24	<0.040	NS							
Selenium	NT	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.01							
Silver	NT	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.05							
Sodium	NT	68.6	109	62.8	38.8	19.8	<0.100	20							
Thallium	NT	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.0005							
Vanadium	NT	0.169	0.149	0.321	0.342	0.646	<0.004	NS							
Zinc	NT	3.46	2.31	6.03	4.86	8.26	<0.020	5							
<b>Dissolved Metals</b>															
Aluminum	NT	2.71	0.153	13.1	0.641	0.28	0.118	NS							
Antimony	NT	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.003							
Arsenic	NT	<0.040	0.193	0.08	<0.040	0.176	<0.040	0.025							
Barium	NT	0.692	1.31	1.91	0.549	1.04	<0.004	1							
Beryllium	NT	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.003							
Cadmium	NT	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.005							
Calcium	NT	308	909	410	344	415	0.477	NS							
Chromium	NT	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.05							
Cobalt	NT	0.009	0.024	0.018	<0.008	0.024	<0.008	NS							
Copper	NT	0.007	0.006	0.011	0.004	0.004	<0.004	0.2							
Iron	NT	37.4	59.6	88.6	29.4	44.1	<0.040	0.3							
Lead	NT	0.084	0.044	0.77	<0.040	0.062	<0.040	0.025							
Magnesium	NT	31	36.9	25.6	16.8	19.6	0.05	35							
Manganese	NT	2.54	5.05	3.1	2.13	3.7	<0.004	0.30							
Mercury	NT	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0003	0.0007							
Nickel	NT	0.011	0.038	0.024	<0.010	0.023	<0.010	0.1							
Potassium	NT	22	39.2	18.2	17.6	10.1	0.288	NS							
Selenium	NT	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.01							
Silver	NT	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.05							
Sodium	NT	68.4	120	63.9	36	16.5	0.166	20							
Thallium	NT	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.0005							
Vanadium	NT	0.041	0.007	0.215	0.004	0.004	<0.004	NS							
Zinc	NT	0.538	0.547	1.97	0.11	0.506	0.038	5							

NS...No Standard

mg/L...milligrams per Liter

NT...Not Tested

ND...Not Detected

Shaded values represent concentration exceeding the GQS

**Table 8**  
**Soil Vapor Analytical Results**  
**498 Leonard Street, Brooklyn, New York**

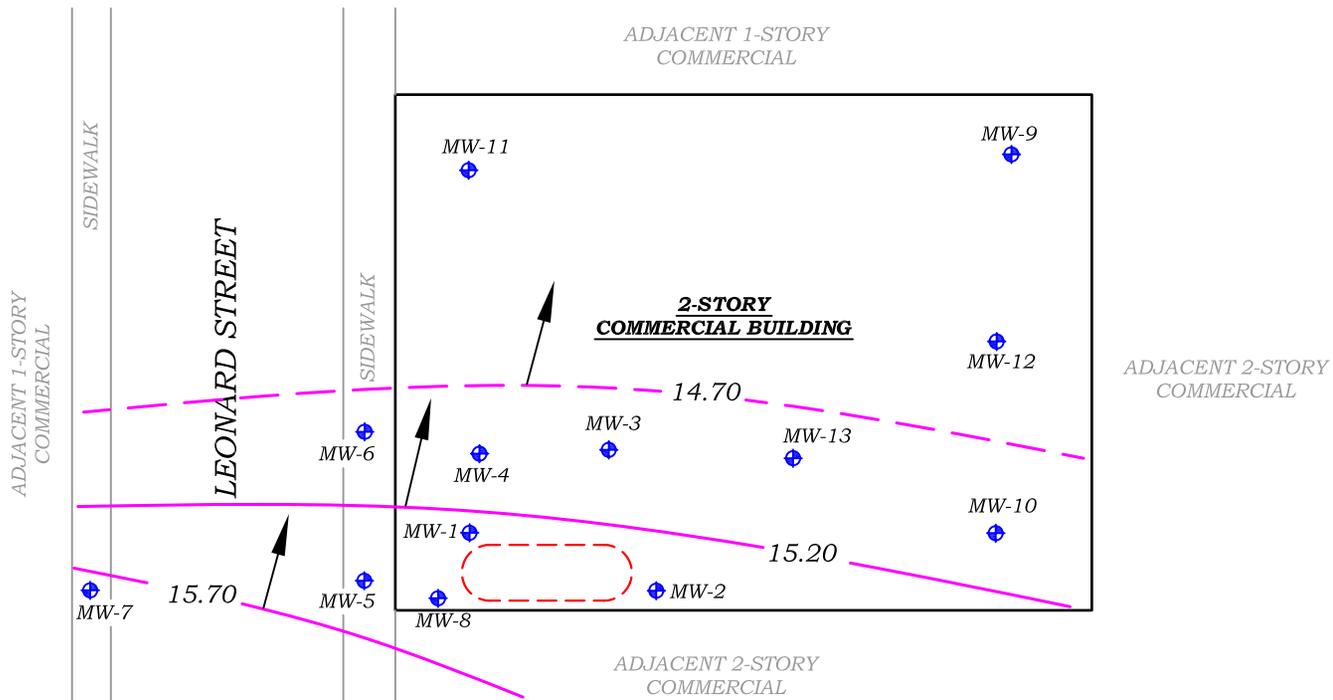
Sample ID	SV-2 (Y52)	SV-3 (YAL011)	SV-4 (Y74)	SV-5 (Y81)	NYSDOH Background Standards - Indoor Air
Sampling Date	10/22/2012	10/22/2012	10/22/2012	10/22/2012	
Matrix	Soil Vapor	Soil Vapor	Soil Vapor	Soil Vapor	
Units	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	
Volatile Organics, EPA TO15 Full List					
1,1,1-Trichloroethane	24 D	16 D	14 D	<2.2	0.25
1,1,2,2-Tetrachloroethane	<3.4	<3.4	<2.9	<3.8	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	<1.1	<1.1	<0.95	<1.2	NS
1,1,2-Trichloroethane	<2.9	<2.8	<2.4	<3.1	0.25
1,1-Dichloroethane	<1.0	<1.0	<0.86	<1.1	NS
1,1-Dichloroethylene	<1.2	<1.2	<1.1	<1.4	0.25
1,2,4-Trichlorobenzene	<3.4	<3.3	<2.9	<3.7	0.25
1,2,4-Trimethylbenzene	61 D	1.2 J	1.0 J	<1.3	0.69
1,2-Dibromoethane	<16	<16	<14	<18	NS
1,2-Dichlorobenzene	<3.1	<3.1	<2.7	<3.4	0.25
1,2-Dichloroethane	<2.0	<2.0	<1.7	<2.2	0.25
1,2-Dichloropropane	<2.1	<2.1	<1.8	<2.3	0.25
1,2-Dichlorotetrafluoroethane	<2.5	<2.4	<2.1	<2.7	25
1,3,5-Trimethylbenzene	24 D	1.3 J	<1.1	<1.5	0.27
1,3-Butadiene	<1.4	<1.3	<1.1	<1.5	NS
1,3-Dichlorobenzene	<2.3	<2.2	<1.9	<2.5	0.25
1,4-Dichlorobenzene	<2.8	<2.7	<2.3	<3.0	0.25
1,4-Dioxane	<6.8	<6.6	<5.7	<7.4	NS
2-Butanone	<2.5	<2.4	<2.1	<2.7	NS
2-Hexanone	<4.7	<4.6	<4.0	<5.1	NS
4-Methyl-2-pentanone	<3.1	<3.0	<2.6	<3.4	NS
Acetone	17 B,D	14 B,D	26 B,D	500 B,D	10
Benzene	<1.0	<0.98	<0.85	<1.1	1.1
Benzyl chloride	<1.3	<1.3	<1.1	<1.4	NS
Bromodichloromethane	<3.1	<3.1	<2.6	<3.4	NS
Bromoform	<3.9	<3.8	<3.3	<4.2	NS
Bromomethane	<0.97	<0.96	<0.82	<1.1	NS
Carbon disulfide	<0.78	<0.77	<0.66	<0.85	NS
Carbon tetrachloride	<1.6	<1.5	<1.3	<1.7	0.25
Chlorobenzene	<1.7	<1.7	<1.5	<1.9	0.25
Chloroethane	<0.66	<0.65	<0.56	<0.72	NS
Chloroform	<1.5	33 D	<1.3	<1.7	0.25
Chloromethane	<1.3	<1.3	<1.1	<1.4	0.25
cis-1,2-Dichloroethylene	<1.4	<1.4	<1.2	<1.5	NS
cis-1,3-Dichloropropylene	<2.4	<2.3	<2.0	<2.6	NS
Cyclohexane	<0.86	<0.85	<0.73	58 D	0.25
Dibromochloromethane	<17	<16	<14	<18	NS
Dichlorodifluoromethane	<2.6	<2.5	<2.2	<2.8	0.25
Ethyl acetate	<1.9	<1.8	<1.6	<2.1	NS
Ethyl Benzene	12 D	12 D	11 D	<1.8	0.41
Hexachlorobutadiene	<4.0	<3.9	<3.4	<4.4	NS
Isopropanol	<1.8	<1.8	<1.5	<2.0	NS
Methyl Methacrylate	<8.6	<8.4	<7.2	<9.3	NS
Methyl tert-butyl ether (MTBE)	<0.90	<0.89	<0.76	<0.98	0.25
Methylene chloride	<1.7	12 D	<1.5	<1.9	0.31
n-Heptane	<1.0	<1.0	<0.87	<1.1	1
n-Hexane	<0.88	<0.87	<0.75	<0.96	0.63
o-Xylene	25 D	19 D	16 D	<1.8	0.39
p- & m- Xylenes	53 D	48 D	43 D	<3.4	0.5
p-Ethyltoluene	1.9 J	1.8 J	1.6 J	<2.0	NS
Propylene	<1.7	<1.6	<1.4	<1.8	NS
Styrene	<1.6	<1.6	<1.4	<1.7	0.25
Tetrachloroethylene	30 D	<1.7	<1.4	<1.9	NS
Tetrahydrofuran	<1.5	<1.5	<1.3	<1.7	0.25
Toluene	22 D	29 D	32 D	<2.1	3.5
trans-1,2-Dichloroethylene	<1.0	<0.98	<0.84	<1.1	NS
trans-1,3-Dichloropropylene	<1.7	<1.7	<1.4	<1.9	NS
Trichloroethylene	<1.3	<1.3	<1.1	<1.5	NS
Trichlorofluoromethane (Freon 11)	<0.71	<0.69	<0.60	<0.77	NS
Vinyl acetate	<1.1	<1.1	<0.93	<1.2	NS
Vinyl Chloride	<1.3	<1.3	<1.1	<1.4	0.25
Total VOCs	269.9	187.3	144.6	558	NS

B=analyte found in the analysis batch blank

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

D=result is from an analysis that required a dilution

NS=this indicates that no regulatory limit has been established for this analyte



C.I. = 0.50 Feet

Monitoring Well IDs	Groundwater Elevations
MW-1	15.31
MW-2	15.25
MW-3	14.80
MW-4	14.80
MW-5	15.41
MW-6	14.77
MW-7	15.71
MW-8	15.45
MW-9	14.85
MW-10	14.95
MW-11	14.86
MW-12	14.89
MW-13	14.82

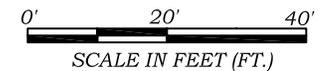
LEGEND:

⊕ MONITORING WELL LOCATION (MW)

⋯ DASHED WHERE INFERRED

~ CONTOUR LINES

C.I. CONTOUR INTERVAL



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498 Leonard Street  
Brooklyn, NY.  
HTE Job# 120196

Drawn By: C.Q.  
Reviewed By: M.R.  
Approved By: M.S.  
Date: 10/23/12  
Scale: AS NOTED

TITLE:

FIGURE 1: GROUNDWATER FLOW CONTOUR DIAGRAM



SP-16				
Depth	0' - 2'	10' - 12'		
VOCs	µg/Kg	µg/Kg	USCO	RSCO
sec-Butylbenzene	NAS	16,400	11,000	100,000

SP-13				
Depth	0' - 2'	10' - 12'		
VOCs	µg/Kg	µg/Kg	USCO	RSCO
sec-Butylbenzene	NAS	31,900	11,000	100,000
n-Butylbenzene	NAS	13,600	12,000	100,000
tert-Butylbenzene	NAS	9,910	5,900	100,000

SP-14				
Depth	0' - 2'	10' - 12'		
VOCs	µg/Kg	µg/Kg	USCO	RSCO
sec-Butylbenzene	NAS	26,700	11,000	100,000
tert-Butylbenzene	NAS	15,300	5,900	100,000

SP-18				
Depth	0' - 2'	10' - 12'		
VOCs	µg/Kg	µg/Kg	USCO	RSCO
sec-Butylbenzene	NAS	47,900	11,000	100,000
n-Butylbenzene	NAS	20,700	12,000	100,000
tert-Butylbenzene	NAS	13,000	5,900	100,000

SP-15	NS
-------	----

SP-17				
Depth	0' - 2'	10' - 12'		
VOCs	µg/Kg	µg/Kg	USCO	RSCO
sec-Butylbenzene	NAS	52,100	11,000	100,000
n-Butylbenzene	NAS	33,400	12,000	100,000
tert-Butylbenzene	NAS	11,600	5,900	100,000
n-Propylbenzene	NAS	25,300	3,900	100,000

SP-7		
Depth	0' - 2'	10' - 12'
VOCs	NAS	NAS

SP-8		
Depth	0' - 2'	10' - 12'
VOCs	NAS	NAS

SP-5		
Depth	0' - 2'	10' - 12'
VOCs	NAS	NAS

SP-9	NS
------	----

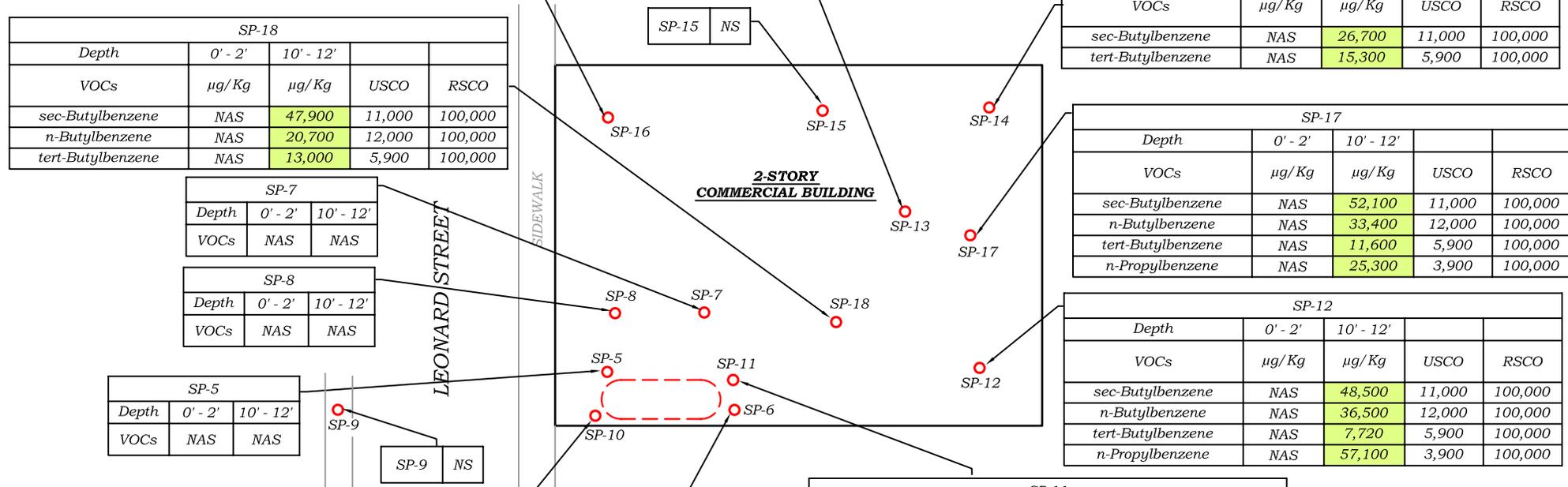
SP-10		
Depth	0' - 2'	10' - 12'
VOCs	NAS	NAS

SP-6		
Depth	0' - 2'	10' - 12'
VOCs	NAS	NAS

SP-11				
Depth	0' - 2'	10' - 12'		
VOCs	µg/Kg	µg/Kg	USCO	RSCO
sec-Butylbenzene	NAS	30,900	11,000	100,000
tert-Butylbenzene	NAS	13,600	5,900	100,000

LEGEND:

- SOIL PROBE LOCATIONS (SP)
- VOC VOLATILE ORGANIC COMPOUND
- µg/Kg MICROGRAMS PER KILOGRAM
- NAS NONE ABOVE STANDARD
- NS NOT SAMPLED
- USCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
- RSCO RESTRICTED USE SOIL CLEANUP OBJECTIVES
- SHADED VALUES EXCEED TRACK 1 SCO



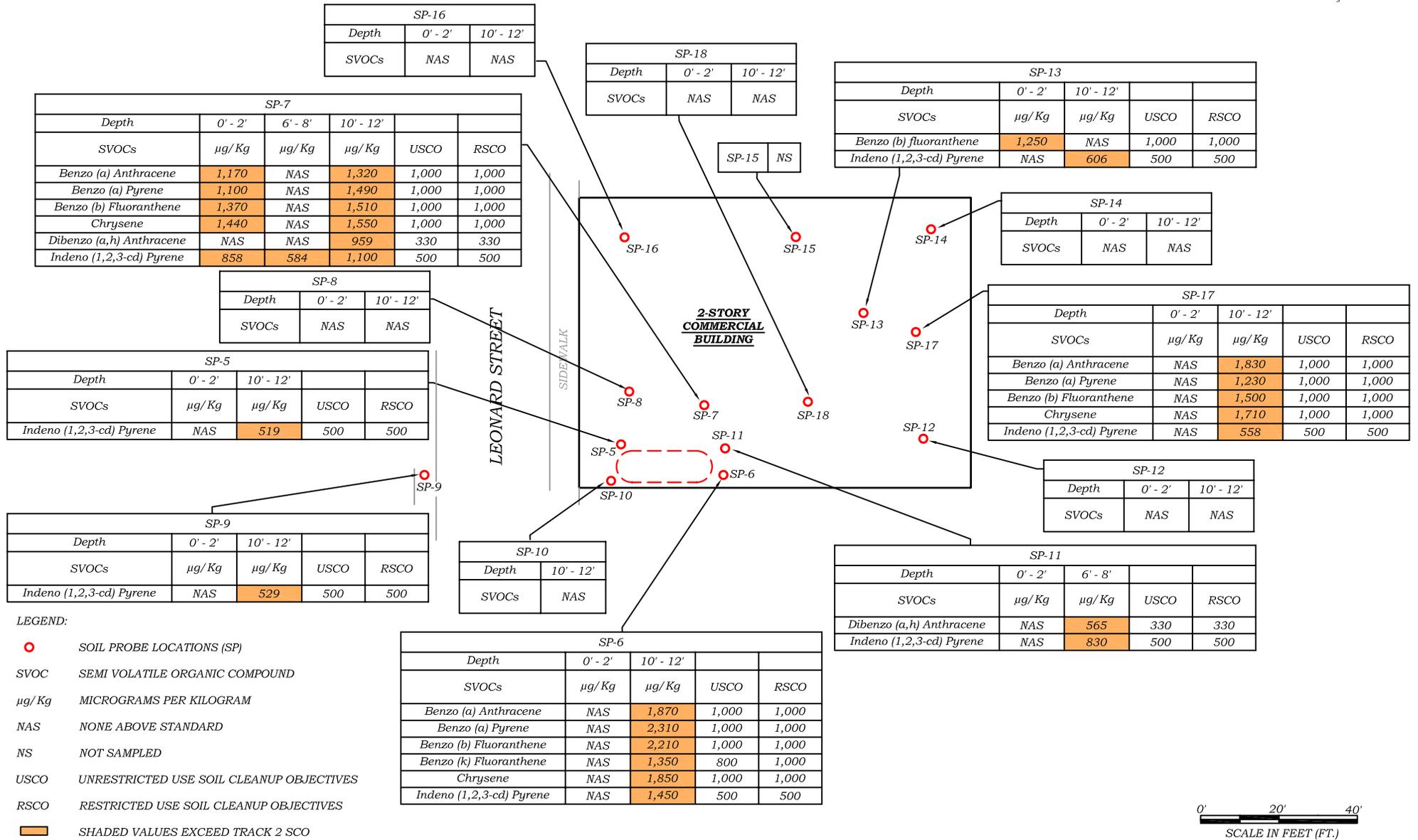
**Hydro Tech Environmental Corp.**  
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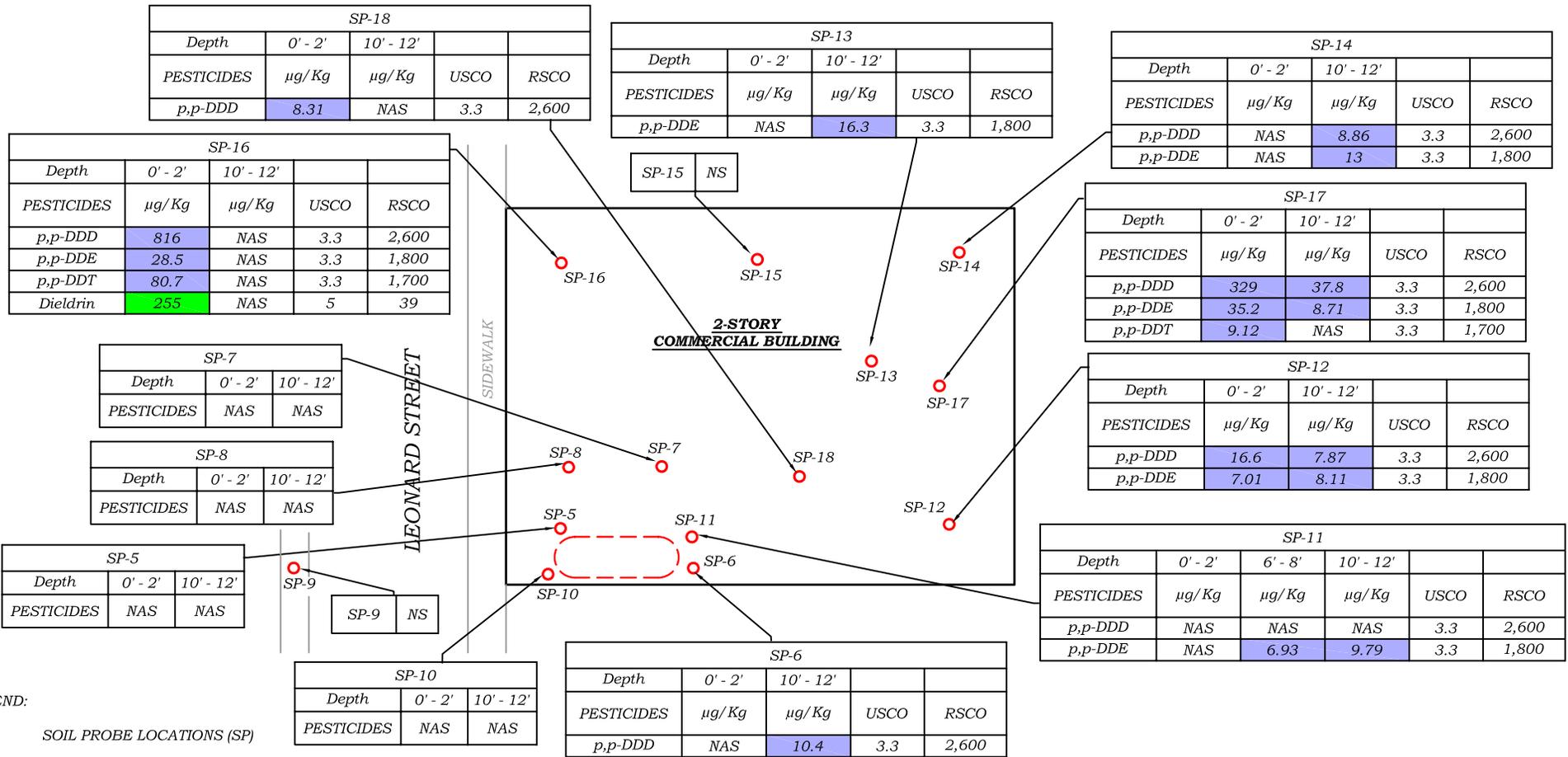
498 Leonard Street  
 Brooklyn, NY.  
 HTE Job# 120196

Drawn By: C.Q.  
 Reviewed By: M.R.  
 Approved By: M.S.  
 Date: 10/11/12  
 Scale: AS NOTED

TITLE:

FIGURE 2: VOCs CONTAMINATION IN SOIL





- LEGEND:**
- SOIL PROBE LOCATIONS (SP)
  - µg/Kg MICROGRAMS PER KILOGRAM
  - NAS NONE ABOVE STANDARD
  - USCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
  - RSCO RESTRICTED USE SOIL CLEANUP OBJECTIVES
  - SHADED VALUES EXCEED TRACK 1 SCO
  - SHADED VALUES EXCEED TRACK 2 SCO



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Scale: AS NOTED

TITLE:

FIGURE 4: PESTICIDES CONTAMINATION IN SOIL



SP-7				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Chromium Trivalent	43.9	82.4	30	36
Arsenic	59.0	16.1	13	16
Barium	777	818	350	350
Cadmium	3.46	NAS	2.5	2.5
Chromium Hexavalent	43.9	NAS	1	22
Copper	148	113	50	270
Lead	2,020	1,650	63	400
Manganese	1,970	NAS	1,600	2,000
Mercury	25.3	2.67	0.18	0.81
Zinc	500	379	109	2,200

SP-14				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Arsenic	18.2	34.8	13	16
Cadmium	3.88	3.75	2.5	2.5
Copper	127	120	50	270
Lead	1,150	3,000	63	400
Mercury	NAS	0.207	0.18	0.81
Zinc	1,400	664	109	2,200

SP-13				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Arsenic	NAS	40.6	30	36
Barium	NAS	879	13	16
Copper	156	407	50	270
Lead	590	2,660	63	400
Mercury	NAS	NAS	0.18	0.81
Zinc	385	2,080	109	2,200

SP-16				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Arsenic	15.1	16.3	13	16
Cadmium	2.8	3.11	2.5	2.5
Copper	211	88.9	50	270
Lead	806	527	63	400
Zinc	1,040	346	109	2,200

SP-17				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Cadmium	2.98	NAS	2.5	2.5
Copper	59.9	NAS	50	270
Lead	188	NAS	63	400
Mercury	0.52	NAS	0.18	0.81
Zinc	132	NAS	109	2,200

SP-8				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Cadmium	2.79	NAS	2.5	2.5
Copper	NAS	283	50	270
Lead	135	5,730	63	400
Mercury	1.05	0.6657	0.18	0.81
Zinc	290	619	109	2,200

SP-5				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Arsenic	NAS	41.5	13	16
Barium	NAS	451	350	350
Cadmium	2.82	2.80	2.5	2.5
Copper	NAS	51.4	50	270
Lead	NAS	283	63	400
Mercury	NAS	5.12	0.18	0.81
Zinc	296	166	109	2,200

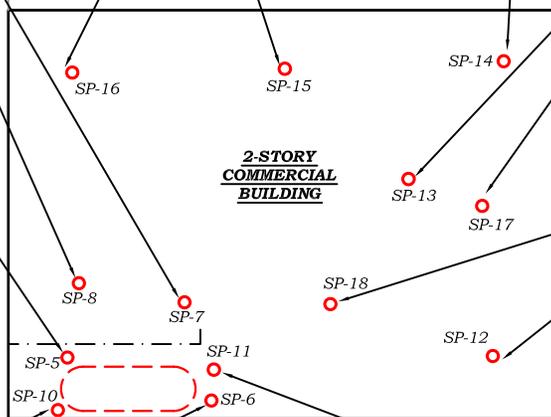
SP-18				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Cadmium	5	NAS	2.5	2.5
Copper	177	NAS	50	270
Lead	919	83.5	63	400
Mercury	0.524	0.317	0.18	0.81
Zinc	1,340	NAS	109	2,200

SP-9				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Cadmium	NAS	2.85	2.5	2.5
Lead	400	373	63	400
Mercury	1.04	1.35	0.18	0.81
Zinc	113	NAS	109	2,200

SP-10 NS

SP-15 NS

LEONARD STREET  
SIDEWALK



2-STORY  
COMMERCIAL  
BUILDING

SP-12				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Cadmium	6.85	NAS	2.5	2.5
Copper	82.5	NAS	50	270
Lead	626	136	63	400
Mercury	0.368	NAS	0.18	0.81
Zinc	384	NAS	109	2,200

SP-11					
Depth	0' - 2'	6' - 8'	10' - 12'		
METALS	mg/Kg	mg/Kg	mg/Kg	USCO	RSCO
Arsenic	14.5	NAS	NAS	13	16
Cadmium	4.02	NAS	2.88	2.5	2.5
Copper	77.5	NAS	73.6	50	270
Lead	523	247	467	63	400
Mercury	0.189	NAS	NAS	0.18	0.81
Zinc	642	269	141	109	2,200

SP-6				
Depth	0' - 2'	10' - 12'		
METALS	mg/Kg	mg/Kg	USCO	RSCO
Barium	NAS	2.59	350	350
Lead	320	NAS	63	400
Mercury	0.435	2.10	0.18	0.81
Zinc	538	NAS	109	2,200

LEGEND:

- SOIL PROBE LOCATIONS (SP)
- mg/Kg MILLIGRAMS PER KILOGRAM
- NAS NONE ABOVE STANDARD
- USCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
- RSCO RESTRICTED USE SOIL CLEANUP OBJECTIVES
- GRAY SHADED VALUES EXCEED TRACK 1 SCO
- YELLOW SHADED VALUES EXCEED TRACK 2 SCO



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TITLE:

FIGURE 5: METAL CONTAMINATION IN SOIL



MW-4		
VOCs	µg/L	GQS
sec-Butylbenzene	41.2	5
n-Butylbenzene	7.40	5
tert-Butylbenzene	13.0	5
4-Isopropyltoluene	12.2	5
SVOCs	µg/L	GQS
Naphthalene	11.4	10

MW-11		
VOCs	µg/L	GQS
sec-Butylbenzene	206	5
n-Butylbenzene	53.2	5
tert-Butylbenzene	65.0	5
Isopropylbenzene	6.90	5
SVOCs	NAS	
PESTICIDES	µg/L	GQS
Dieldrin	0.05	0.004

MW-3		
VOCs	µg/L	GQS
sec-Butylbenzene	53.3	5
n-Butylbenzene	15.8	5
tert-Butylbenzene	15.4	5
Isopropylbenzene	8.10	5
4-Isopropyltoluene	27.8	5
SVOCs	NAS	

MW-13		
VOCs	µg/L	GQS
sec-Butylbenzene	389	5
n-Butylbenzene	194	5
tert-Butylbenzene	106	5
Isopropylbenzene	35.5	5
SVOCs	NAS	

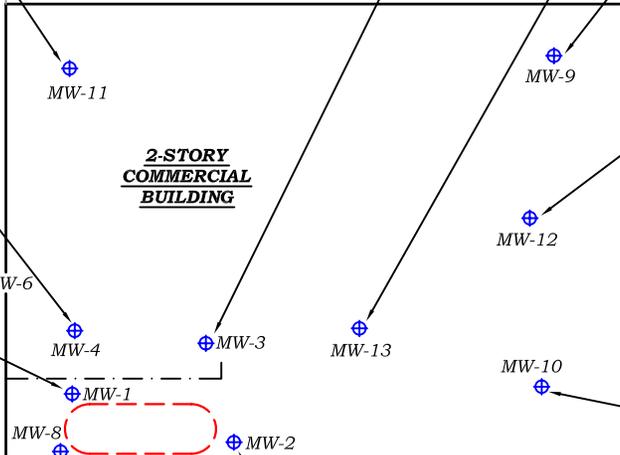
MW-6		
VOCs	µg/L	GQS
sec-Butylbenzene	24.1	5
tert-Butylbenzene	9.56	5
SVOCs	µg/L	GQS
Indeno(1,2,3-cd)Pyrene	2.36	0.002

MW-1		
VOCs	µg/L	GQS
Benzene	12.6	1
sec-Butylbenzene	23.8	5
n-Butylbenzene	11.2	5
Ethylbenzene	51.3	5
Isopropylbenzene	25.8	5
Methyl-t-butyl ether	16.2	10
1,2,4-Trimethylbenzene	30.8	5
1,3,5-Trimethylbenzene	7.25	5
o-Xylene	12.6	5
m,p-Xylene	11.4	5
SVOCs	µg/L	GQS
Acenaphthene	62.2	20
Fluoranthene	63.1	50
Fluorene	92.2	50
Naphthalene	63.0	10
Phenanthrene	226	50
Pyrene	68.2	50

MW-9		
VOCs	µg/L	GQS
sec-Butylbenzene	24.2	5
tert-Butylbenzene	12.60	5
SVOCs	NAS	

MW-12		
VOCs	µg/L	GQS
sec-Butylbenzene	544	5
n-Butylbenzene	350	5
tert-Butylbenzene	105	5
Isopropylbenzene	307	5
SVOCs	NAS	

MW-10		
VOCs	µg/L	GQS
sec-Butylbenzene	100	5
n-Butylbenzene	53.0	5
tert-Butylbenzene	27.6	5
Isopropylbenzene	35.4	5
SVOCs	NAS	



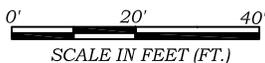
MW-5		
VOCs	µg/L	GQS
sec-Butylbenzene	41.2	5
n-Butylbenzene	7.40	5
tert-Butylbenzene	13.0	5
Isopropylbenzene	12.2	5
SVOCs	µg/L	GQS
Indeno(1,2,3-cd)Pyrene	2.34	0.002

MW-2		
VOCs	µg/L	GQS
sec-Butylbenzene	40.3	5
n-Butylbenzene	14.4	5
tert-Butylbenzene	12.0	5
Isopropylbenzene	9.90	5
SVOCs	µg/L	GQS
Acenaphthene	62.2	20
bis(2-Ethylhexyl)phthalate	40.3	5
Fluoranthene	63.1	50
Fluorene	92.2	50
Phenanthrene	226	50
Pyrene	68.2	50

MW-7		
VOCs	µg/L	GQS
Benzene	79.2	1
sec-Butylbenzene	25.5	5
n-Butylbenzene	31.6	5
Ethylbenzene	11.8	5
Isopropylbenzene	118	5
Toluene	7.85	5
m,p-Xylene	29.8	5
SVOCs	NAS	

LEGEND:

- ⊕ MONITORING WELL LOCATION (MW)
- VOC VOLATILE ORGANIC COMPOUNDS
- SVOC SEMI VOLATILE ORGANIC COMPOUNDS
- µg/L MICROGRAMS PER LITER
- NAS NONE ABOVE STANDARDS
- NS NOT SAMPLED
- GQS GROUNDWATER QUALITY STANDARDS
- SHADED VALUES EXCEED GQS



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 HTE Job# 120196

Drawn By: C.Q.  
 Reviewed By: M.R.  
 Approved By: M.S.  
 Date: 10/11/12  
 Scale: AS NOTED

TITLE:

FIGURE 6: PESTICIDES, VOCs & SVOCs CONTAMINATION IN GROUNDWATER



MW-11			
METALS	Total Metals	Dissolved Metals	GQS
Arsenic	0.183	0.08	0.025
Barium	5.16	1.91	1
Beryllium	0.006	NAS	0.003
cadmium	0.024	NAS	0.005
Chromium	0.126	NAS	0.05
Trivalent Chromium	0.126	NAS	0.05
Copper	0.881	NAS	0.2
Iron	157	88.6	0.3
Lead	8.71	0.77	0.025
Manganese	13.3	3.1	0.30
Mercury	0.0872	NAS	0.0007
Nickel	0.164	NAS	0.1
Sodium	62.8	63.9	20
Zinc	6.03	NAS	5

MW-12			
METALS	Total Metals	Dissolved Metals	GQS
Arsenic	0.141	NAS	0.025
Barium	4.26	NAS	1
Beryllium	0.007	NAS	0.003
cadmium	0.021	NAS	0.005
Chromium	0.122	NAS	0.05
Trivalent Chromium	0.122	NAS	0.05
Copper	1.12	NAS	0.2
Iron	179	29.4	0.3
Lead	9.09	NAS	0.025
Manganese	3.2	2.13	0.30
Mercury	0.0694	NAS	0.0007
Nickel	0.168	NAS	0.1
Sodium	38.8	36	20

MW-9			
METALS	Total Metals	Dissolved Metals	GQS
Arsenic	0.097	NAS	0.025
Barium	1.89	NAS	1
Chromium	0.123	NAS	0.05
Trivalent Chromium	0.123	NAS	0.05
Copper	0.723	NAS	0.2
Iron	125	37.4	0.3
Lead	4.99	0.084	0.025
Magnesium	36.3	NAS	35
Manganese	2.74	2.54	0.30
Mercury	0.187	NAS	0.0007
Nickel	0.114	NAS	0.1
Sodium	68.6	68.4	20

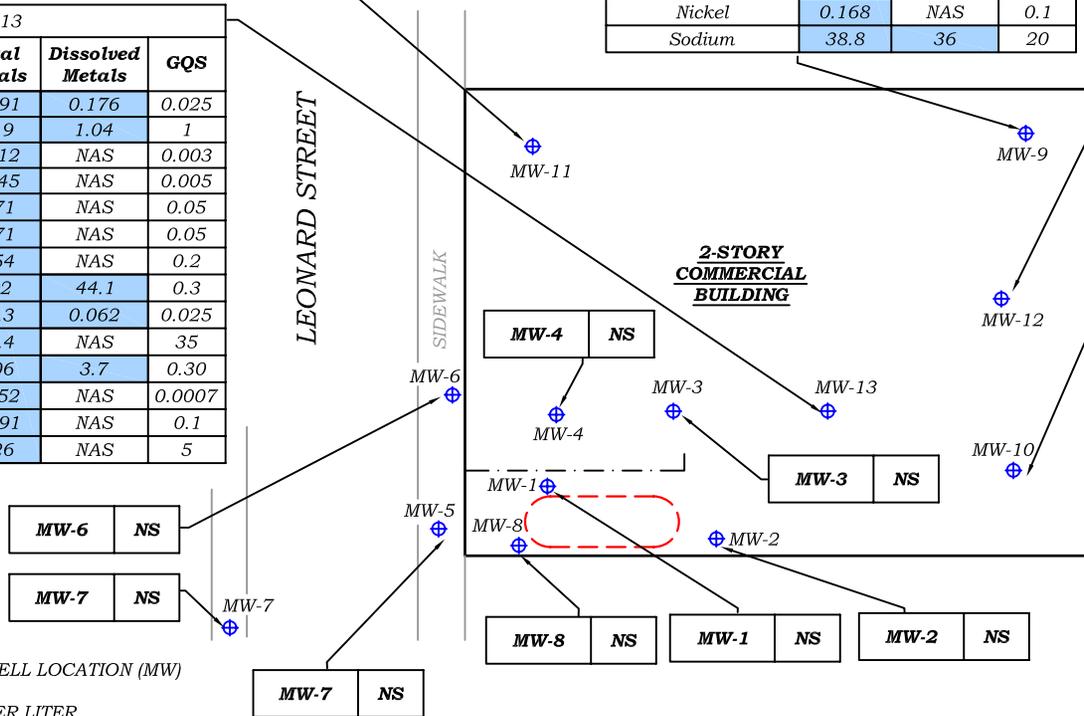
MW-13			
METALS	Total Metals	Dissolved Metals	GQS
Arsenic	0.991	0.176	0.025
Barium	11.9	1.04	1
Beryllium	0.012	NAS	0.003
cadmium	0.045	NAS	0.005
Chromium	0.71	NAS	0.05
Trivalent Chromium	0.71	NAS	0.05
Copper	2.54	NAS	0.2
Iron	402	44.1	0.3
Lead	51.3	0.062	0.025
Magnesium	35.4	NAS	35
Manganese	5.06	3.7	0.30
Mercury	0.852	NAS	0.0007
Nickel	0.391	NAS	0.1
Zinc	8.26	NAS	5

MW-10			
METALS	Total Metals	Dissolved Metals	GQS
Arsenic	1.16	0.193	0.025
Barium	1.74	1.31	1
Chromium	0.063	NAS	0.05
Trivalent Chromium	0.063	NAS	0.05
Copper	0.425	NAS	0.2
Iron	77.9	59.6	0.3
Lead	5.04	0.044	0.025
Magnesium	NAS	36.9	35
Manganese	1.7	5.05	0.30
Mercury	172	NAS	0.0007
Nickel	0.103	NAS	0.1
Sodium	109	120	20

LEONARD STREET

SIDEWALK

2-STORY  
COMMERCIAL  
BUILDING



LEGEND:

- MONITORING WELL LOCATION (MW)
- mg/L MILLIGRAMS PER LITER
- NAS NONE ABOVE STANDARDS
- GQS GROUNDWATER QUALITY STANDARDS
- SHADED VALUES EXCEED GQS



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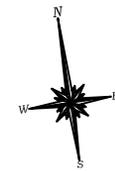
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 Scale: AS NOTED

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FIGURE 7: METAL CONTAMINATION IN GROUNDWATER



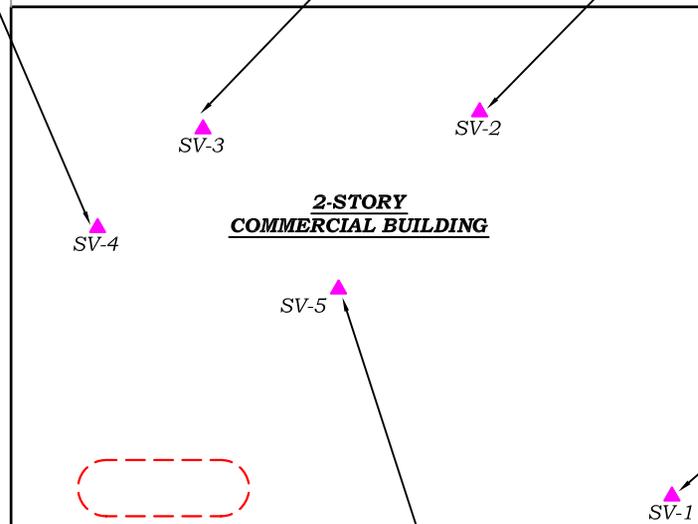
SV-4		
VOCs	$\mu\text{g}/\text{m}^3$	BS - Indoor Air
1,1,1-Trichloroethane	14	0.25
Acetone	26	10
Ethyl Benzene	11	0.41
o-Xylene	16	0.39
p- & m- Xylenes	43	0.5
Toluene	32	3.5

SV-3		
VOCs	$\mu\text{g}/\text{m}^3$	BS - Indoor Air
1,1,1-Trichloroethane	16	0.25
Acetone	14	10
Chloroform	33	0.25
Ethyl Benzene	12	0.41
o-Xylene	19	0.39
p- & m- Xylenes	48	0.5
Toluene	29	3.5

SV-2		
VOCs	$\mu\text{g}/\text{m}^3$	BS - Indoor Air
1,1,1-Trichloroethane	24	0.25
1,2,4-Trimethylbenzene	61	0.69
1,3,5-Trimethylbenzene	24	0.27
Acetone	17	10
Ethyl Benzene	12	0.41
o-Xylene	25	0.39
p- & m- Xylenes	53	0.5
Tetrachloroethylene	30	0.25
Toluene	22	3.5

LEONARD STREET

SIDEWALK



SV-5		
VOCs	$\mu\text{g}/\text{m}^3$	BS - Indoor Air
Acetone	500	10

LEGEND:

- SOIL VAPOR IMPLANTS (SV)
- VOC VOLATILE ORGANIC COMPOUNDS
- $\mu\text{g}/\text{m}^3$  MICROGRAMS PER CUBIT METER
- BS BACKGROUND STANDARDS



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FIGURE 8: VOCs CONTAMINATION IN SOIL VAPOR



## **APPENDIX A2**

GRANT engineering Remedial Action Work Plan (7/30/13)

**498 LEONARD STREET**  
**BROOKLYN, NEW YORK**

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# **Remedial Action Work Plan**

**BLOCK 2698, LOT 11**  
**NYC VCP Number: 13CVCP144K**  
**NYC E-Designation Site Number: 13EHAZ197K**

**Prepared for:**

**Mr. Jack Fung**  
**(917) 663-3803**

**Prepared by:**



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**JULY 31, 2013**

# REMEDIAL ACTION WORK PLAN

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11. Legend for Figure 4 through 10

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Table 1 - Soil Analytical Data Summary

Table 2 - Groundwater Analytical Data Summary

Table 3 - Soil Vapor Analytical Data Summary

# **APPENDICES**

## **Appendices**

1. Citizen Participation Plan
2. Sustainability Statement
3. Soil/Materials Management Plan
4. Construction Health and Safety Plan
5. Warranty, Product and Installation Information for Vapor Barrier System

## LIST OF ACRONYMS

<b>Acronym</b>	<b>Definition</b>
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
VCA	Voluntary Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer

PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Sub-grade Storage Tank
VOC	Volatile Organic Compound

# CERTIFICATION

I, Stephen A. Morse, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 498 Leonard Street.

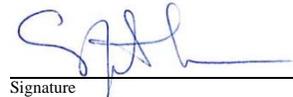
I certify that this Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Stephen A. Morse

Name

083918

NYS PE License Number



Signature

7/31/2013

Date



Stephen A. Morse

QEP Name



QEP Signature

7/31/2013

Date

## **EXECUTIVE SUMMARY**

Mr. Jack Fung is proposing to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 7,400-square foot site located in the Greenpoint section in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### **Site Location and Current Usage**

The Site is located at 498 Leonard Street in the Greenpoint section of Brooklyn, New York and is identified as Block 2698 and Lot 11 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 7,400-square feet and is bounded by a 1-story structure commercial property to the north, Leonard Street to the west, a 2-story commercial property to the south, and a 2-story commercial property to the east. Figure 1 shows the Site location. Currently, the Site contains one (1), 2-story commercial building and a paved lot with an underground storage tank (UST) present in the southwest portion of the property. A map of the site boundary is shown in Figure 2. It is understood that the Site's current use is for factory and industrial purposes and that the current owner is Mr. John Huey.

### **Summary of Proposed Redevelopment Plan**

Mr. Jack Fung plans to acquire the Site and intends to develop the Site with a multi-story residential building. Redevelopment engineering plans are not in place for the Site at the time of this report and the applicant will submit a final development plan to OER prior to the start of the remedial action. It is anticipated that the footprint of the planned residential structure will comprise the majority of the Site. The proposed plan is to demolish the existing structure and construct a multi-story residential building that is expected to include a 65' x 74' cellar. The proposed building is planned to be constructed starting from the property line along the length of Leonard Street and extending east. The Site is located in a mixed-use district, containing both manufacturing and residential lots, designated as M1-2/R61 by zoning map 13a. There is a mixture of manufacturing and residential buildings in the immediate vicinity of the Site.

## **Summary of Past Uses of Site and Areas of Concern**

### *Past Uses and Ownership*

A review of the Phase I Environmental Site Assessment (ESA) dated February 12, 2013 indicates that the Site has historically been utilized for industrial purposes.

The Site assessment was conducted by GRANT on February 5, 2013 and recorded surficial conditions only. The assessment included a walk-through of the site and surroundings. The Phase I ESA included a review of regulatory agency databases and historical documents and visual observations of the Site and adjoining properties.

Review of the regulatory agency database indicated that the Site is listed as E-Designation for hazardous materials and is considered a REC.

A leaking underground petroleum storage tank of No. 2 fuel oil on Site resulted in a NYSDEC Spill Case Number 1206982 opened on October 16, 2012. A spill from a leaking 5,000 gallon underground storage tank occurred on August 20, 2012 and resulted in a NYSDEC Spill Case Number 0212132. A spill of No. 2 fuel oil from a tank test failure occurred on Site in 2003 (NYSDEC Spill Case Number 0212132) and was closed in 2006. The leaking UST may have impacted soil, groundwater and/or soil vapor at the Site. All spills were identified at Brumar Sheet Metal Inc. located at 498 Leonard Street (the Site). The issue has yet to be reconciled and the tank is still listed as an open case in the LTANKS database and is considered a REC.

The Site was listed on the New York City Department of City Planning (NYCDCP) list of e-designated properties. The NYC Office of Environmental Remediation (OER) is required to review and approve environmental investigation and environmental mitigation measures in order for a Certificate of Occupancy (COO) to be issued by New York City Department of Buildings (NYCDOB).

### *Previous Investigations*

- Phase I ESA, dated February 12, 2013, prepared by GRANT engineering.

- Phase II Environmental Site Investigation conducted by Hydro Tech Environmental Corporation (HTE) dated October 2012.

### Site Inspection

A site inspection for the Phase I ESA was conducted on February 5, 2013 by Betsy Gillard, EIT of GRANT. A site inspection for the RIR was conducted on January 17, 2013 by Mr. Stephen Morse and Ms. Liza Billings, EIT of GRANT. Mr. Stephen Morse was the Qualified Environmental Professional (QEP) evaluating potential areas of concern. The site inspection revealed that the Site is currently developed with the same existing structures described in the Phase I ESA.

### Areas of Concern

The Phase I identified RECs associated with the historic usage of the Site and surrounding properties. The Phase II conducted by HTE in October 2012 identified the presence of elevated SVOCs, metals and pesticides in surficial soil samples collected from the depth of 0-2 ftbg and elevated VOCs, SVOCs, metals, and pesticides in soil samples collected from 10-12 ftbg. The HTE Phase II also identified elevated VOCs, SVOCs, metals and pesticides in groundwater and elevated VOCs in soil vapor. Therefore, AOCs are identified for this site.

1. One (1) underground storage tank (UST) present in the southwest portion of the Site with two open NYSDEC Spill Case numbers 1206982 and 0212132.
2. Petroleum contaminated soil located throughout the Site from approximately 12 to 30 ft bg.

### **Summary of the Work Performed under the Remedial Investigation**

GRANT performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. In February 2013, installed five (5) soil borings (SB-01 to SB-05) surrounding the underground storage tank in the southwest portion of the Site. In April 2013, installed seven (7) soil borings (SB-06 to SB-12) across the entire project Site, and collected

- nineteen (19) soil samples for chemical analysis, and seven (7) of those samples had further finger printing analysis for determination of soil quality;
3. In April 2013, installed three (3) groundwater monitoring wells (TWP-01, TWP-02, and TWP-03) throughout the Site to establish groundwater flow and collected three (3) groundwater samples for chemical analysis to evaluate groundwater quality; and
  4. Installed three (3) soil vapor probes (SVP-01, SV-02, and SVP-03) around the proposed future site perimeter and collected three (3) samples for chemical analysis.

Figure 3 depicts the locations of the soil borings, temporary well points and soil vapor samples that were advanced during the RI.

### **Summary of Environmental Findings**

1. Depth to groundwater was present at approximately ten (10) feet below grade at the Site during the RIR. HTE installed 13 monitoring wells on the Site and adjacent sidewalk in October 2012. The monitoring wells were surveyed and groundwater table elevations were measured between 14.77 and 15.71.
2. Groundwater flow direction is generally from the south towards the north.
3. Bedrock was not encountered during the RI.
4. The stratigraphy of the site from the surface down consists of a layer of historic fill material from approximately 0 to 12 feet below grade (ftbg), sand, gravel and silt with heavy petroleum impacts from 12-16 ft bg, visible petroleum staining from 16-30 ft bg in the area of the UST and an impacted layer of highly compressible organic peat, clay and silt from 16-28 ft bg throughout the remainder of the Site and a highly compressible layer of clay/silt that appears to function as an hydraulic barrier at approximately 28-34 ft bg.
5. Soils during Phase 2: Five SVOC (all PAH) exceeded both Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential SCOs in two of 13 shallow soil samples. The maximum concentration of these exceedences was 1.440 ppm. Seven SVOCs, all PAH, exceeded Track 2 Restricted Residential Use SCOs in up to eight of 15 deep soil samples. A variety of petroleum derived VOCs were detected but were below Track 1 SCOs in shallow soil samples. Four VOC, all petroleum derived compounds, exceeded Track 1

Unrestricted Use SCOs in deep soil samples but did not exceed Track 2 Restricted Residential Use SCOs. Maximum concentration of these exceedences was 57.1 ppm. One pesticide (dieldrin; maximum concentration 255 ppb) was detected above Track 2 Restricted Residential SCOs and three pesticides were also detected only above Track 1 Unrestricted SCOs in 2 to 4 shallow soil samples. Two pesticides were detected above Track 1 SCOs in deep samples but did not exceed Track 2 Restricted Residential Use SCOs. The following metals were detected above Track 2 Restricted Residential SCOs: arsenic (2 shallow samples, maximum 59 ppm; 5 deep samples, maximum 41.5 ppm), barium (1 shallow sample, maximum 777 ppm; 3 deep samples, maximum 879 ppm), cadmium (9 shall samples, maximum 6.85 ppm; 6 deep samples, maximum 3.75 ppm), lead (9 shall samples, maximum 2020 ppm; 6 deep samples, maximum 5730 ppm), mercury (3 shallow samples, maximum 25.3 ppm; 4 deep samples, maximum 5.12 ppm). Chromium, copper and zinc also exceeded Track 1 Unrestricted Use SCOs but not Track 2 Restricted Residential SCOs in both shallow and deep soil samples.

6. Soils during RI: PCBs were not detected in soil samples collected during the Remedial Investigation. One VOC, acetone was detected in two (2) samples (at 160 µg/kg and 404 µg/kg), above the Unrestricted Use SCO but well below Restricted Residential Use SCO. SVOCs were detected in one sample (12-16 feet) above the Restricted Residential Use SCOs. They include benzo(a)anthracene (11,600 µg/kg), benzo(a)pyrene (11,700 µg/kg), benzo(b)fluoranthene (9,840 µg/kg), chrysene (9,670 µg/kg), dibenzo(a,h)anthracene (1,900 µg/kg) and indeno(1,2,3-cd)pyrene (5,910 µg/kg). Elevated levels of metals including arsenic, copper, lead, mercury, vanadium, and zinc were detected above the Unrestricted Use Soil Cleanup Objectives (SCOs), and of these, arsenic (74 mg/kg), lead (1,440 mg/kg) and mercury (31 mg/kg) also detected above Restricted Residential Use SCOs. One pesticide 4,4-DDD was detected (11-13 feet) at 54.9 µg/kg, above the Unrestricted Use SCO but below the Restricted Residential Use SCO. The Gas Chromatograph (GC) fingerprint analysis conducted on seven borings did not identify the presence of any compounds with the exception of mineral spirits. Soil sample results are provided in Table 1.

GW during Phase 2: Thirteen groundwater samples collected during the Phase II showed 13 VOC's, all petroleum derivatives, above groundwater quality standards (GQS). All were below 50 ppb except benzene derivatives, which had a maximum concentration of 544 ppb. Seven SVOC, all PAH compounds, were observed above GQS. The maximum concentration was for Phenanthrene at 503 ppb. Five groundwater samples showed arsenic (3 samples, maximum 193 ppb), barium (3 samples, maximum 1900 ppb and lead (4 samples, maximum 84 ppb), and iron, manganese, magnesium and sodium above GWS. One pesticide, dieldrin, exceeded GQS (1 sample, 50 ppb).

7. Groundwater samples collected during the RI showed that SVOCs, pesticides and PCBs were not detected in the groundwater samples. Eight VOCs including 1,2,4-trimethylbenzene (7.7 ug/l), 1,2,4,5-trimethylbenzene (135 ug/l), tert-butylbenzene (43 ug/l), isopropylbenzene (70 ug/l), n-propylbenzene (121 ug/l), n-butylbenzene (63 ug/l), and sec-butylbenzene (160 ug/l) were detected above GQS of 5 ppb. Three metals including arsenic (25 ppb), lead (36 ppb), and mercury (1.6 ppb) were detected above GQS. Groundwater sample results are provided in Table 2.
8. Phase 2: One chlorinated VOC was detected in one of four soil vapor samples (PCE, 30 ug/m<sup>3</sup>). TCE, 111-TCA and carbon tetrachloride were not detected. These findings were below State DOH monitor levels. Five petroleum derivatives were also detected with maximum concentrations of up to 61 ug/m<sup>3</sup>.
9. RI: Soil vapor samples collected during the RI showed a variety of VOCs, including petroleum hydrocarbons and chlorinated VOCs. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected. Chlorinated VOCs including 1,1,1-trichloroethane (40 ug/m<sup>3</sup>), carbon tetrachloride (23 ug/m<sup>3</sup>), tetrachloroethylene (50 ug/m<sup>3</sup>), and trichloroethylene (20 ug/m<sup>3</sup>) were at concentrations that are below the monitoring level ranges established within the State DOH soil vapor guidance matrix. Soil vapor results are provided in Table 3.

## Summary of the Remedy

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The preferred remedial action alternative is a Track 4 remedial action. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC BCP citizen participation activities according to an approved Citizen Participation Plan (CPP);
2. Performance of a Community Air Monitoring Plan (CAMP) for particulates and VOCs.
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs. Removal of arsenic and mercury hotspots;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs;
5. Removal of the 5,000 gallon on site underground storage tank (UST) containing No. 2 fuel oil and any other unknown sub-grade storage tanks that may be present and closure of the associated open petroleum spills (NYSDEC Spill Case numbers 1206982 and 0212132) under the authority of NYSDEC and in compliance with applicable local, State and Federal laws and regulations.

6. Sampling of groundwater monitoring wells and treatment of groundwater under the authority of NYS DEC to address petroleum contamination;
7. Capping with concrete building slab in all developed areas and with two feet of certified clean fill in landscaped areas to prevent human exposure to residual soil/fill remaining under the Site;
8. Installation of a vapor barrier system beneath the proposed cellar floor and walls of the Site building and an active sub-slab depressurization system to address migration of off-site soil vapors. Submittal of a Design Report for the vapor barrier system and sub slab depressurization system for OER approval prior to the start of development;
9. Demarcation of residual soil/fill;
10. Import of materials to be used for backfill and cover, as needed, in compliance with OER approved plan and in accordance with applicable Federal, State and City laws and regulations;
11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
12. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
13. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
16. Groundwater treatment to address the petroleum spill under NYS DEC authority;

17. Performance of groundwater sampling from all remaining monitoring wells after remediation is completed consistent with NYSDEC requirements for spill closure. If needed, additional means of groundwater remediation for may be required as determined by NYSDEC;
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities certifies including any changes from this RAWP, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all engineering and institutional controls to be implemented at the Site, and lists any changes from this RAWP;
19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of engineering and institutional controls and reporting at a specified frequency; and
20. Continued registration with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls and management of these controls in compliance with an approved SMP. Institutional controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

## **COMMUNITY PROTECTION STATEMENT**

The Office of Environmental Remediation created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies that show the location of contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities. This cleanup plan also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

**Remedial Investigation and Cleanup Plan.** Under the NYC VCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

**Identification of Sensitive Land Uses.** Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

**Qualitative Human Health Exposure Assessment.** An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA).

**Health and Safety Plan.** This cleanup plan includes a Health and Safety Plan that is designed to protect community residents and on-Site workers. The elements of this plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration. This plan includes many protective elements including those discussed below.

**Site Safety Coordinator.** This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Mr. Zack Leeser, of GRANT and can be reached at (212) 464-8689 or (415) 686 2017.

**Worker Training.** Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

**Community Air Monitoring Plan.** Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact NYC Office of Environmental Remediation Project Manager Mr. William Wong at (212) 341-0659 or via email to [wiwong@dep.nyc.gov](mailto:wiwong@dep.nyc.gov).

**Quality Assurance.** This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

**Storm-Water Management.** To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm water

management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

**Hours of Operation.** The hours for operation of cleanup will comply with the NYC Department of building construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7 AM to 6 PM.

**Signage.** While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Brownfield Cleanup Program, provides project contact names and numbers, and locations of project documents can be viewed.

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the NYC Office of Environmental Remediation Project Manager Mr. William Wong at (212) 341-0659 or via email to [wiwong@dep.nyc.gov](mailto:wiwong@dep.nyc.gov), or call 311 and mention the Site is in the NYC Brownfield Cleanup Program.

**Utility Mark-outs.** To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

**Soil and Liquid Disposal.** All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations and required permits will be obtained.

**Soil Chemical Testing and Screening.** All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

**Stockpile Management.** Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly

replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

**Trucks and Covers.** Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

**Imported Material.** All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on-Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

**Equipment Decontamination.** All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

**Housekeeping.** Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

**Truck Routing.** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

**Final Report.** The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at BrooklynPublic Library Greenpoint Branch located at 107 Norman Avenue at Leonard Street.

**Long-Term Site Management.** To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

# **REMEDIAL ACTION WORK PLAN**

## **1.0 SITE BACKGROUND**

Mr. Jack Fung has proposed to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 7,400-square foot site located in the Greenpoint section in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### **1.1 SITE LOCATION AND CURRENT USAGE**

The Site is located at 498 Leonard Street in the Greenpoint section of Brooklyn, New York and is identified as Block 2698 and Lot 11 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 7,400-square feet and is bounded by a 1-story structure commercial property to the north, Leonard Street to the west, a 2-story commercial property to the south, and a 2-story commercial property to the east. Figure 1 shows the Site location. Currently, the Site contains one (1), 2-story commercial building and a paved lot with an underground storage tank (UST) present in the southwest portion of the property. A map of the site boundary is shown in Figure 2. It is understood that the Site's current use is for factory and industrial purposes and that the current owner is Mr. John Huey.

### **1.2 PROPOSED REDEVELOPMENT PLAN**

Mr. Jack Fung plans to acquire the Site and intends to develop the Site with a multi-story residential building. Redevelopment engineering plans are not in place for the Site at the time of this report and the applicant will submit a final development plan to OER prior to the start of the remedial action. It is anticipated that the footprint of the planned residential structure will comprise the majority of the Site. The proposed plan is to demolish the existing structure and construct a multi-story residential building that is expected to include a 65' x 74' cellar. The proposed building is planned to be constructed starting from the property line along the length of

Leonard Street and extending east. The Site is located in a mixed-use district, containing both manufacturing and residential lots, designated as M1-2/R61 by zoning map 13a. There is a mixture of manufacturing and residential buildings in the immediate vicinity of the Site.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

### **1.3 DESCRIPTION OF SURROUNDING PROPERTY**

The current usage and nature of immediate surrounding properties includes multistory apartment buildings, commercial storefronts, an auto repair shop, and an industrial / manufacturing facility. As of present day, none of these adjacent land uses are suspected of using hazardous materials in quantities that if released, might have the potential to impact the environmental status of the subject property.

The Site is located at 498 Leonard Street, Brooklyn New York and is comprised of Block 2698 and Lot 11. The Site is 7,400-square feet and is bounded by a 1-story structure commercial property to the north, Leonard Street to the west, a 2-story commercial property to the south, and a 2-story commercial property to the east. A map of the site boundary is shown in Figure 2.

### **1.4 REMEDIAL INVESTIGATION**

A site investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report for 498 Leonard Street*”, dated May 28, 2013 (RIR).

#### **Summary of Past Uses of Site and Areas of Concern**

##### *Past Uses and Ownership*

A review of the Phase I Environmental Site Assessment (ESA) dated February 12, 2013 indicates that the Site has historically been utilized for industrial purposes.

The Site assessment was conducted by GRANT on February 5, 2013 and recorded surficial conditions only. The assessment included a walkthrough of the site and surroundings. The Phase I ESA included a review of regulatory agency databases and historical documents and visual observations of the Site and adjoining properties.

Review of the regulatory agency database indicated that the Site is listed as E-Designation for hazardous materials and is considered a REC.

A leaking underground petroleum storage tank of No. 2 fuel oil on Site resulted in a NYSDEC Spill Case Number 1206982 opened on October 16, 2012. A spill from a leaking 5,000 gallon underground storage tank occurred on August 20, 2012 and resulted in a NYSDEC Spill Case Number 0212132. A spill of No. 2 fuel oil from a tank test failure occurred on Site in 2003 (NYSDEC Spill Case Number 0212132) and was closed in 2006. The leaking UST may have impacted soil, groundwater and/or soil vapor at the Site. All spills were identified at Brumar Sheet Metal Inc. located at 498 Leonard Street (the Site). The issue has yet to be reconciled and the tank is still listed as an open case in the LTANKS database and is considered a REC.

Since the Site was listed on the New York City Department of City Planning (NYCDPC) list of e-designated properties. Therefore, the Office of Environmental Remediation (OER) is required to review and approve environmental investigation and environmental mitigation measures in order for a Certificate of Occupancy (COO) to be issued by New York City Department of Buildings (NYCDOB).

#### Previous Investigations

- Phase I ESA, dated February 12, 2013, prepared by GRANT engineering.
- Phase II Environmental Site Investigation conducted by Hydro Tech Environmental Corporation (HTE) dated October 2012.

#### Site Inspection

A site inspection for the Phase I ESA was conducted on February 5, 2013 by Betsy Gillard, EIT of GRANT. A site inspection for the RIR was conducted on January 17, 2013 by Mr. Stephen Morse and Ms. Liza Billings, EIT of GRANT. Mr. Stephen Morse was the Qualified Environmental Professional (QEP) evaluating potential areas of concern. The site inspection revealed that the Site is currently developed with the same existing structures described in the Phase I ESA.

### Areas of Concern

The Phase I identified RECs associated with the historic usage of the Site and surrounding properties. The Phase II conducted by HTE in October 2012 identified the presence of elevated SVOCs, metals and pesticides in surficial soil samples collected from the depth of 0-2 ftbg and elevated VOCs, SVOCs, metals, and pesticides in soil samples collected from 10-12 ftbg. The HTE Phase II also identified elevated VOCs, SVOCs, metals and pesticides in groundwater and elevated VOCs in soil vapor. Therefore, AOCs are identified for this site.

1. One (1) underground storage tank (UST) present in the southwest portion of the Site with two open NYSDEC Spill Case numbers 1206982 and 0212132.
2. Petroleum contaminated soil located throughout the Site from approximately 12 to 30 ftbg.
3. Evidence of fill varying from 2 to 12 feet.

### **Summary of the Work Performed under the Remedial Investigation**

GRANT performed the following scope of work:

- 1 Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
- 2 In February 2013, installed five (5) soil borings (SB-01 to SB-05) surrounding the underground storage tank in the southwest portion of the Site. In April 2013, installed seven (7) soil borings (SB-06 to SB-12) across the entire project Site, and collected nineteen (19) soil samples for chemical analysis, and seven (7) of those samples had further finger printing analysis for determination of soil quality;
- 3 In April 2013, installed three (3) groundwater monitoring wells (TWP-01, TWP-02, and TWP-03) throughout the Site to establish groundwater flow and collected three (3) groundwater samples for chemical analysis to evaluate groundwater quality; and
- 4 Installed three (3) soil vapor probes (SVP-01, SV-02, and SVP-03) around the proposed future site perimeter and collected three (3) samples for chemical analysis.

Figure 3 depicts the locations of the soil borings, temporary well points and soil vapor samples that were advanced during the RI.

## Summary of Environmental Findings

1. Depth to groundwater was present at approximately ten (10) feet below grade at the Site during the RIR. HTE installed 13 monitoring wells on the Site and adjacent sidewalk in October 2012. The monitoring wells were surveyed and groundwater table elevations were measured between 14.77 and 15.71.
2. Groundwater flow direction is generally from the south towards the north.
3. Bedrock was not encountered during the RI.
4. The stratigraphy of the site from the surface down consists of a layer of historic fill material from approximately 0 to 12 feet below grade (ft bg), sand, gravel and silt with heavy petroleum impacts from 12-16 ft bg, visible petroleum staining from 16-30 ft bg in the area of the UST and an impacted layer of highly compressible organic peat, clay and silt from 16-28 ft bg throughout the remainder of the Site and a highly compressible layer of clay/silt that appears to function as a hydraulic barrier at approximately 28-34 ft bg.
5. Soils during Phase 2: Five SVOC (all PAH) exceeded both Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential SCOs in two of 13 shallow soil samples. The maximum concentration of these exceedences was 1.440 ppm. Seven SVOCs, all PAH, exceeded Track 2 Restricted Residential Use SCOs in up to eight of 15 deep soil samples. A variety of petroleum derived VOCs were detected but were below Track 1 SCOs in shallow soil samples. Four VOC, all petroleum derived compounds, exceeded Track 1 Unrestricted Use SCOs in deep soil samples but did not exceed Track 2 Restricted Residential Use SCOs. Maximum concentration of these exceedences was 57.1 ppm. One pesticide (dieldrin; maximum concentration 255 ppb) was detected above Track 2 Restricted Residential SCOs and three pesticides were also detected only above Track 1 Unrestricted SCOs in 2 to 4 shallow soil samples. Two pesticides were detected above Track 1 SCOs in deep samples but did not exceed Track 2 Restricted Residential Use SCOs. The following metals were detected above Track 2 Restricted Residential SCOs: arsenic (2 shallow samples, maximum 59 ppm; 5 deep samples, maximum 41.5 ppm), barium (1 shallow sample, maximum 777 ppm; 3 deep samples, maximum 879 ppm), cadmium (9 shall samples, maximum 6.85 ppm; 6 deep samples, maximum 3.75 ppm),

lead (9 shall samples, maximum 2020 ppm; 6 deep samples, maximum 5730 ppm), mercury (3 shallow samples, maximum 25.3 ppm; 4 deep samples, maximum 5.12 ppm). Chromium, copper and zinc also exceeded Track 1 Unrestricted Use SCOs but not Track 2 Restricted Residential SCOs in both shallow and deep soil samples.

6. Soils during RI: PCBs were not detected in soil samples collected during the Remedial Investigation. One VOC, acetone was detected in two (2) samples (at 160 µg/kg and 404 µg/kg), above the Unrestricted Use SCO but well below Restricted Residential Use SCO. SVOCs were detected in one sample (12-16 feet) above the Restricted Residential Use SCOs. They include benzo(a)anthracene (11,600 µg/kg), benzo(a)pyrene (11,700 µg/kg), benzo(b)fluoranthene (9,840 µg/kg), chrysene (9,670 µg/kg), dibenzo(a,h)anthracene (1,900 µg/kg) and indeno(1,2,3-cd)pyrene (5,910 µg/kg). Elevated levels of metals including arsenic, copper, lead, mercury, vanadium, and zinc were detected above the Unrestricted Use Soil Cleanup Objectives (SCOs), and of these, arsenic (74 mg/kg), lead (1,440 mg/kg) and mercury (31 mg/kg) also detected above Restricted Residential Use SCOs. One pesticide 4,4-DDD was detected (11-13 feet) at 54.9 µg/kg, above the Unrestricted Use SCO but below the Restricted Residential Use SCO. The Gas Chromatograph (GC) fingerprint analysis conducted on seven borings did not identify the presence of any compounds with the exception of mineral spirits. Soil sample results are provided in Table 1.
- GW during Phase 2: Thirteen groundwater samples collected during the Phase II showed 13 VOC's, all petroleum derivatives, above groundwater quality standards (GQS). All were below 50 ppb except benzene derivatives, which had a maximum concentration of 544 ppb. Seven SVOC, all PAH compounds, were observed above GQS. The maximum concentration was for Phenanthrene at 503 ppb. Five groundwater samples showed arsenic (3 samples, maximum 193 ppb), barium (3 samples, maximum 1900 ppb and lead (4 samples, maximum 84 ppb), and iron, manganese, magnesium and sodium above GWS. One pesticide, dieldrin, exceeded GQS (1 sample, 50 ppb).
7. Groundwater samples collected during the RI showed that SVOCs, pesticides and PCBs were not detected in the groundwater samples. Eight VOCs including 1,2,4-trimethylbenzene (7.7 ug/l), 1,2,4,5-trimethylbenzene (135 ug/l), tert-butylbenzene (43

ug/l), isopropylbenzene (70 ug/l), n-propylbenzene (121 ug/l), n-butylbenzene (63 ug/l), and sec-butylbenzene (160 ug/l) were detected above GQS of 5 ppb. Three metals including arsenic (25 ppb), lead (36 ppb), and mercury (1.6 ppb) were detected above GQS. Groundwater sample results are provided in Table 2.

8. Phase 2: One chlorinated VOC was detected in one of four soil vapor samples (PCE, 30 ug/m<sup>3</sup>). TCE, 111-TCA and carbon tetrachloride were not detected. These findings were below State DOH monitor levels. Five petroleum derivatives were also detected with maximum concentrations of up to 61 ug/m<sup>3</sup>.
9. RI: Soil vapor samples collected during the RI showed a variety of VOCs, including petroleum hydrocarbons and chlorinated VOCs. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected. Chlorinated VOCs including 1,1,1-trichloroethane (40 ug/m<sup>3</sup>), carbon tetrachloride (23 ug/m<sup>3</sup>), tetrachloroethylene (50 ug/m<sup>3</sup>), and trichloroethylene (20 ug/m<sup>3</sup>) were at concentrations that are below the monitoring level ranges established within the State DOH soil vapor guidance matrix. Soil vapor results are provided in Table 3.

## **2.0 REMEDIAL ACTION OBJECTIVES**

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site:

### **Groundwater**

- Remove contaminant sources causing impact to groundwater.
- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.
- Prevent contaminants volatilizing from groundwater from migrating into dwelling and other occupied structures.

### **Soil**

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater contamination.

### **Soil Vapor**

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

### **3.0 REMEDIAL ALTERNATIVES ANALYSIS**

The goal of the remedy selection process under is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedence of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance;
- Land use; and
- Sustainability.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

#### **Alternative 1 involves:**

- Establishment of Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs has been achieved with post-excavation endpoint sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would require excavation across the entire Site to a depth of approximately to 16 feet to removal all fill. Excavation for construction of the new

building's cellar level is anticipated to take place to a depth of approximately 10-12 feet over 70% (4,800 sf) of the Site. Additional excavation will be required in setback areas to achieve Track 1.

- No Engineering or Institutional Controls are required for a Track 1 cleanup. However, remedial action is required to address the residual soil vapor observed on site and thus a Track 1 remedial action is not feasible on this basis. A vapor barrier and sub slab depressurization system would be installed beneath the basement foundation and behind foundation sidewalls of the new building to prevent any potential future exposures from off-Site soil vapor. Further, groundwater impacts are in excess of the GQS will require future monitoring and treatment under the authority of NYS DEC.

#### **Alternative 2 involves**

- Establishment of Track 4 Site-Specific SCOs.
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs, including hotspots for arsenic and mercury, and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. Anticipated excavation for construction of the new building's cellar level would take place to a depth of approximately 10-12 feet for the 70% (4,800 sf) of the Site. Therefore, if soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs.
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier/waterproofing system beneath the building slab and along foundation side walls to prevent any potential future exposures from off-Site soil vapor;
- Installation of an active SSDS system beneath the building slab;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable

gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;

- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- The property will continue to be registered with an E-Designation at the NYC Buildings Department; and
- Groundwater treatment to address the petroleum spill under NYS DEC authority and other actions required by NYS DEC.

### **3.1 THRESHOLD CRITERIA**

#### **Protection of Public Health and the Environment**

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

**Alternative 1** would be protective of human health and the environment by removing contaminated soil/fill exceeding Track 1 Unrestricted Use SCOs and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater. Soil vapor management would address the risk of vapor migration into the building. Additional work performed under the authority of NYSDEC would address groundwater contamination from the petroleum spill. Formal attainment of Track 1 status is not currently feasible.

**Alternative 2** would achieve comparable protections of human health and the environment by excavating the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCOs, as well as by placement of Institutional and Engineering controls,

including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and continued “E” designation of property would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier/waterproofing system below the new building's basement slab and continuing the vapor barrier around foundation walls.

### **3.2. BALANCING CRITERIA**

#### **Compliance with Standards, Criteria and Guidance (SCGs)**

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier/waterproofing system below the new building's basement slab and continuing the vapor barrier around foundation walls, as part of development, in addition to installation of an active sub slab depressurization system.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier/waterproofing system below the new building's basement slab and continuing the vapor barrier around foundation walls

in addition to installation of an active sub slab depressurization system. A Site Management Plan would ensure that these controls remained protective for the long term.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs shall be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

### **Short-term effectiveness and impacts**

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both Alternative 1 and 2 have similar short-term effectiveness during their respective implementations, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short term impacts would potentially be higher for Alternative 1 because excavation of greater amounts of historical fill material. However, focused attention to means and methods during the remedial action during the removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 160, 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

Both alternatives would employ appropriate measures to prevent short term impacts, including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) will be protected from on-Site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones).

### **Long-term effectiveness and permanence**

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill, thereby reducing contaminants in groundwater, and enabling unrestricted usage of the property. Additional engineering and institutional controls would be required to address soil vapor migration risks and additional remedial activity under the authority of NYS DEC would be required to address remaining groundwater contamination from the petroleum spill.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs, and establishing Engineering Controls including a composite cover system across the Site, a vapor barrier and SSDS; establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan and maintaining registration of the E-Designation for the property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by

requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity. Additional remedial activity under the authority of NYS DEC would be required to address remaining groundwater contamination from the petroleum spill.

Both alternatives would result in removal of soil contamination exceeding the SCOs providing a high level, effective, and permanent remedy over the long-term and would address contaminated soil and minimize any leaching to groundwater.

### **Reduction of toxicity, mobility, or volume of contaminated material**

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use SCOs. Residual groundwater contamination would be treated under NYS DEC authority to further reduce contaminant loads. Alternative 1 would eliminate a greater total mass of contaminants on Site.

Alternative 2 would permanently eliminate most of the toxicity, mobility, and volume of contaminants from on-site soil by removing soil in excess of Track 4 Site-Specific SCOs. Residual groundwater contamination would be treated under NYS DEC authority to further reduce contaminant loads.

## **Implementability**

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Both Alternatives are feasible and implementable. The techniques, materials and equipment to implement Alternatives 1 and 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. They use standard materials and services that are well established. The reliability of both alternatives is high. The Track 1 alternative requires shoring and creates potential structural issues by removing and replacing more than 13 feet of soil beneath the propose basement level of the building.

## **Cost effectiveness**

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

The capital costs associated with the Alternative 1 are higher than Alternative 2 in that a higher volume of soil/fill will be excavated for off-site disposal to achieve a Track 1 status over the entire site. In both cases, appropriate public health and environmental protections are achieved.

Both alternatives satisfy the threshold balancing criterion and other criterion listed here, and each is fully protective of public health and the environment, will control migration of contaminants, will comply with SCGs, are effective for the short-term and long-term, are implementable, and reduces both mobility and toxicity.

## **Community Acceptance**

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

Based on the overall goals of the remedial program and initial observations by the project team, both of the alternatives for the Site are acceptable to the community. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action. This public comment will be considered by OER prior to approval of this plan.

## **Land use**

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the Site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the Site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the Site.

Alternative 1 provides a remedial action that is beneficial to the surrounding community and is consistent with the goals of the City for remediating and redeveloping brownfield sites. Alternative 2 also provides environmental and public health protection for the intended use. This alternative would allow the use of engineering controls and institutional controls that would provide protections against of site vapor migration.

The proposed redevelopment of the Site is compatible with its current zoning and is consistent with recent development patterns. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 4 Site-Specific SCOs, which are appropriate for its planned residential use. Improvements in the current brownfield condition of the property achieved by

both alternatives are also consistent with the City's goals for cleanup of contaminated land, making them safer and bringing such properties into productive reuse. Both alternatives are equally protective of natural resources and cultural resources.

### **Sustainability of the Remedial Action**

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in *PlaNYC: A Greener, Greater New York*. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

Both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. New York City Clean Soil Bank program may be utilized for reuse of native soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix C.

## **4.0 REMEDIAL ACTION**

### **4.1 SUMMARY OF PREFERRED REMEDIAL ACTION**

The preferred remedial action alternative is Alternative 2, the Track 4 alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC BCP citizen participation activities according to an approved Citizen Participation Plan (CPP);
2. Performance of a Community Air Monitoring Plan (CAMP) for particulates and VOCs.
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs. Removal of arsenic and mercury hotspots;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs;
5. Removal of the 5,000 gallon on site underground storage tank (UST) containing No. 2 fuel oil and any other unknown sub-grade storage tanks that may be present and closure of the associated open petroleum spills (NYSDEC Spill Case numbers 1206982 and 0212132) under the authority of NYSDEC and in compliance with applicable local, State and Federal laws and regulations.
6. Sampling of groundwater monitoring wells and treatment of groundwater under the authority of NYS DEC to address petroleum contamination;

7. Capping with concrete building slab in all developed areas and with two feet of certified clean fill in landscaped areas to prevent human exposure to residual soil/fill remaining under the Site;
8. Installation of a vapor barrier system beneath the proposed cellar floor and walls of the Site building and an active sub-slab depressurization system to address migration of off-site soil vapors. Submittal of a Design Report for the vapor barrier system and sub slab depressurization system for OER approval prior to the start of development;
9. Demarcation of residual soil/fill;
10. Import of materials to be used for backfill and cover, as needed, in compliance with OER approved plan and in accordance with applicable Federal, State and City laws and regulations;
11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
12. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
13. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
16. Groundwater treatment to address the petroleum spill under NYS DEC authority;
17. Performance of groundwater sampling from all remaining monitoring wells after remediation is completed consistent with NYS DEC requirements for spill closure. If

needed, additional means of groundwater remediation for may be required as determined by NYS DEC;

18. Submission of a Remedial Action Report (RAR) that describes the remedial activities certifies including any changes from this RAWP, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all engineering and institutional controls to be implemented at the Site, and lists any changes from this RAWP;
19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of engineering and institutional controls and reporting at a specified frequency; and
20. Continued registration with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls and management of these controls in compliance with an approved SMP. Institutional controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

#### **4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT**

Track 4 Site-Specific Soil Cleanup Objectives (SCOs) are proposed for this project.

The Soil Cleanup Objectives for the Site are:

<b><u>Contaminant</u></b>	<b><u>SCO</u></b>
SVOCs	250 ppm
Arsenic	24 ppm
Barium	800 ppm
Lead	1000 ppm
Mercury	2.5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan Appendix 3.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

### **Estimated Soil/Fill Removal Quantities**

Hotspot areas will be excavated under this remedial action including arsenic and mercury hotspots identified in the Remedial Investigation and end point remedial performance samples will be collected as discussed below. The total quantity of soil/fill expected to be excavated and disposed off-Site in the area of the proposed cellar (65'x74'x10') is approximately 1,782 cubic yards or 2,673 tons. Soil excavation below the water table is anticipated for the area surrounding the UST to be closed and removed in the southwest portion of the Site. The area of petroleum impacted soil may be excavated until no visual evidence of petroleum impacts are present and laboratory analysis confirms the required end point samples taken meet regulatory requirements. Based on the borings advanced during the RI, the area surrounding the on-site UST to be remediated is estimated at up to approximately (40' x 50') 2,000 square feet. The proposed building footprint and cellar will occupy the present area of the UST. Therefore, petroleum impacted material is estimated to be excavated from 10 feet below grade up to 30 feet below grade or until non-impacted material is observed. Therefore, a maximum of (40' x 50' x 20') approximately 1,482 cubic yards or 2,223 tons of petroleum impacted material may be removed at the Site.

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

### **End-Point Sampling**

Removal actions under this plan will be performed in conjunction with confirmation end-point sampling. Post-excavation end-point sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Track 4–Site Specific SCOs, samples will be collected and analyzed for trigger compounds and elements established on the Track 4 Site-Specific SCO list. The approximate collection location

of the six endpoint soil samples is shown on Figure 6. The end-point sampling and testing will be performed promptly following excavation and be completed prior to any site development activities.

In addition, hotspot removal actions will be performed in conjunction with remedial end point sampling at a frequency will consist of the following:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
  - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
  - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Per discussion with OER, after excavation activities are completed four (4) end point samples will be collected and analyzed for Track 4 acceptable levels of the following: Total SVOCs, Arsenic, Barium, Lead and Mercury. The first two samples will be collected at bottom excavation of the grass area and the next two samples will be collected from the bottom of the proposed building footprint. If the levels are not acceptable for Track 4 SCOs, the excavation will continue until an acceptable level is reached.

Post-remediation sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be analyzed for trigger analytes (those for which SCO exceedances are identified) utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/Herbicides/PCBs by EPA Method 8081/8321/8082.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

### **Quality Assurance/Quality Control**

One (1) duplicate sample will be collected for each of 20 samples collected and at least one (1) field and one (1) lab blank samples or more will be collected to sufficiently assess sampling and lab artifacts.

### **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of

soil to be imported into the Site for backfill and cover soil is zero tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is zero tons.

#### **4.2.1 CLOSURE OF NYSDEC SPILLS**

Spill remediation (Numbers 12069824 and 0212132) will be performed independent of this RAWP and under NYSDEC authority. The NYSDEC approved Spill Remedial Action Work Plan including groundwater treatment and monitoring will be performed under NYSDEC authority. Documents are attached as Attachment F of this RAWP.

#### **4.3 ENGINEERING CONTROLS**

The excavation required for the proposed Site development will achieve Track 4 Site Specific SCOs. The following elements will be incorporated into the foundation design as part of the development: composite cover system and soil vapor barrier to address residual contamination remaining at the site. Engineering Controls for this Site are:

- Composite cover system consisting of clean fill/ landscaping consisting of two (2) feet of certified clean fill in landscaped areas or pavement to be used to cap in all areas of the Site not occupied by the building footprint. Concrete slab below the cellar level occupying the entire proposed building footprint 4,800 square feet extending from the western most property line along the length of Leonard Street and extending east;
- Vapor barrier/waterproofing system for the Site cellar floor and walls;
- Active sub-slab depressurization system; and
- Groundwater treatment and monitoring under the authority of NYS DEC.

#### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of the slab below the cellar level beneath the entire cellar footprint, 2 feet of clean soil in landscaped areas, and pavement in other areas.

The composite cover system would be a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR. One or more of the following designs will be used to cap the entire Site during proposed construction:

- Building Foundation System – Minimum of eight inches of ¾” clean stone and eight inches of concrete;
- Pavement – Four to six inches of ¾” quarry process stone and 1.5 to 2 inches of bituminous asphalt;
- Concrete – Four inches of ¾” clean stone and four inches of concrete; and
- Grass Area – A highly visible demarcation barrier (i.e., orange construction fence/landscape fabric/geosynthetic membrane or equivalent) must be installed beneath 18 inches of clean fill, and 6 inches of a vegetative top soil medium.

Top soil cover is expected to be used on Site. If used, the imported clean fill and top soil cover material will not be comprised of any construction and demolition (C&D) debris or other solid waste. It will be segregated at the approved facility or source prior to characterization sampling. Representative samples will be collected by qualified environmental personnel at a frequency of one (1) sample for every 250 cubic yards of cover material and sent to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory for analysis. Samples will be analyzed for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and Pesticides and then compared to Part 375 soil cleanup objectives. The location of the various types engineering controls will conform to the proposed building development plans. The NYC Clean Soil bank may be used for imported clean soil.

### **Vapor Barrier**

Migration of soil vapor will be mitigated with a combination of building slab, vapor barrier system and sub slab depressurization system. The vapor barrier shall be installed beneath the building slab and outside foundation side walls to grade.

The vapor barrier will consist of a 20-mil polyethylene vapor barrier placed over 6” gas permeable layer of clean coarse aggregate. VaporBlock Plus or approved equivalent will be

utilized and will be installed in accordance with the manufacturer instructions. A non-woven geotextile fabric will be placed directly under the vapor barrier to help protect the barrier from damage due to possible sharp coarse aggregate. The vapor barrier will be unrolled running the longest dimension parallel with the direction of the pour and all folds should be pulled open to full width. The vapor barrier will be placed over the footings and sealed with Raven Butyl Seal tape or approved equal at the footing-wall connections. Joints will be overlapped a minimum of 12” and sealed between overlaps with 2-sided Raven Butyl Seal Tape and then VaporBondPlus Tape. VaporBlock Plus is a seven-layer co-extruded barrier made from polyethylene and barrier resins to provide impact strength as well as resistance to gas and moisture transmission. VaporBlock Plus is a highly resilient under-slab/vertical wall barrier designed to restrict gases from migrating through the ground and concrete slab. VaporBlock Plus is more than 50 times less permeable than typical high performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs. VaporBlock Plus is effective for under-slab barriers in the building industry exceeding ASTM E- 1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. VaporBlock Plus is produced within guidelines of the ISO 9001:2000 Certified Management System. The type of vapor barrier system, manufacturer and warranty will be confirmed by the design team prior to construction and submitted to OER.

### **Sub-Slab Depressurization System**

The VOCs in sub-slab soil vapor will be mitigated by constructing the Site cellar with an active sub-slab depressurization system (SSDS) as described in the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006. The Sub-Slab Depressurization Plan Detail and Cross Section will be generated by the design team prior to construction and submitted in the Design Report to be provided to OER for approval prior to construction.

### **Groundwater Treatment and Monitoring**

Groundwater treatment and monitoring sampling will be performed under the authority of NYS DEC and will comply with all NYS DEC requirements.

#### 4.4 INSTITUTIONAL CONTROLS

Institutional Controls (IC) have been incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be established and will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR. This RAWP includes a description of IC's and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP.

Institutional Controls for this remedial action are:

- Continued registration of the E-Designation for the property;
- Establishment of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ICs and ECs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted monthly and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for restricted residential use and will not be used for a higher level of use without prior approval by OER.

#### **4.5 SITE MANAGEMENT PLAN**

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Brownfield Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) operation and maintenance of EC's; and (3) inspection and certification of EC's.

Site management activities, reporting, and EC/IC certification will be scheduled on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by March 31 of the year following the reporting period.

#### **4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT**

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the BCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This EA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

##### **Known and Potential Sources**

Based on the results of the RIR the contaminants of concern are:

#### Soil:

- SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene exceeding Restricted Residential SCOs.
- metals including arsenic (74 mg/kg), lead (1,440 mg/kg) and mercury (31 mg/kg) detected above Restricted Residential Use SCOs.
- One pesticide 4,4-DDD was identified in soil but did not exceed Restricted Residential Use SCO.

#### Groundwater:

- VOCs consisting of 1,2,4-Trimethylbenzene, 1,2,4,5-Trimethylbenzene, tert-butylbenzene, isopropylbenzene, n-propylbenzene, n-butylbenzene, and sec-butylbenzene detected in groundwater samples above GQS.
- Dissolved phase metals arsenic, lead and mercury detected above their GQS.

#### Soil Vapor:

1. Chlorinated VOCs including 1,1,1-trichloroethane, carbon tetrachloride, tetrachloroethylene, and trichloroethylene detected above monitoring level ranges established within the State DOH soil vapor guidance matrix.
2. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected at low levels.

### **Nature, Extent, Fate and Transport of Contaminants**

Soil: A layer of fill material is present at the Site to a maximum depth of approximately 12 feet. Based on the results of the RI, metals and SVOCs are present throughout the Site in historical fill and petroleum contamination extends to depths of 28-34 ft bg, including contaminants above Track 2 Restricted Residential Use SCOs. Figure 4 identifies VOC contamination in soil at the Site. Figure 5 identifies SVOC contamination in soil at the Site. Figure 6 identified metals contamination in soil at the Site. Figure 7 identifies pesticide contamination in soil at the Site.

Groundwater: Metals arsenic, lead and mercury were found in dissolved phase groundwater samples above TOGS during the RI, indicating that the property may be contributing low level

groundwater contamination. VOCs are present in groundwater throughout the Site. Based on the results of the RI, the VOCs 1,2,4-Trimethylbenzene, 1,2,4,5-Trimethylbenzene, tert-butylbenzene, isopropylbenzene, n-propylbenzene, n-butylbenzene, and sec-butylbenzene are present above TOGS standards. Based on the results of the HTE Phase II, the VOCs benzene, sec-butylbenzene, n-butylbenzene, ethylbenzene, isopropylbenzene, methyl-t-butyl-ether (MTBE), 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, o-xylene, m,p-xylene are present above TOGS standards. The elevated VOCs in groundwater may likely be the result of the active spills from the on-site UST in the southwest portion of the Site. Figure 8 identifies VOC, SVOC and pesticide contamination in the groundwater at the Site. Figure 9 identifies metals contamination in groundwater at the Site.

Soil Vapor: Chlorinated VOCs including 1,1,1-trichloroethane, carbon tetrachloride, tetrachloroethylene, and trichloroethylene detected above monitoring level ranges established within the State DOH soil vapor guidance matrix. Petroleum hydrocarbons including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, cyclohexane, ethyl benzene, methylene chloride, n-hexane, o-xylene, m&p-xylene, and toluene were detected at low levels. Figure 10 identifies VOC contamination in soil vapor at the Site. Figure 11 includes a legend of all symbols and references for Figure 4 through 10 in this report.

### **Potential Routes of Exposure**

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of water, fill or soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil or building materials.

## **Existence of Human Health Exposure**

### *Current Conditions*

As the site is currently capped with asphalt and concrete, there are no potential exposure pathways from soil/ fill. Groundwater is not exposed at the site, and because the site is served by the public water supply, groundwater is not used at the site. Potential pathways for soil vapor exposure could exist under current conditions, however the site is vacant and there is not opportunity for vapor intrusion into structures.

### *Construction/ Remediation Activities*

Potential exposure pathways to onsite contamination exist for ingestion, dermal, or inhalation exposure by onsite workers and dust release offsite during the remedial action. During the remedial action, on-site exposure pathways will be minimized by preventing access to the site, through implementation of soil/materials management, stormwater pollution prevention, and dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan.

### *Proposed Future Conditions*

Under future remediated conditions, the site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and engineering controls will prevent potential for migration of soil vapors into the building. After the remedial action is complete, there are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

## **Receptor Populations**

On-Site Receptors -The Site is currently vacant and secured; therefore, there are no human receptors under current conditions. During construction and remediation activities, receptors will include construction and remediation workers and people in the immediate vicinity of the site. Under future conditions, receptors will include residents and employees of the proposed residence.

Off-Site Receptors - Potential off-site receptors within a 0.25-mile radius of the Site include: adult and child residents, and commercial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future
3. Building Construction/Renovation (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future

### **Overall Human Health Exposure Assessment**

Complete on-site exposure pathways appear to be present only during the construction and remediation phase. During the remedial action, on-site exposure pathways will be minimized by preventing access to the site, through implementation of soil/ materials management, stormwater pollution prevention, and dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan.

## **5.0 REMEDIAL ACTION MANAGEMENT**

### **5.1 PROJECT ORGANIZATION AND OVERSIGHT**

Principal personnel who will participate in the remedial action include the following representatives from GRANT:

- Senior Engineer, Mr. Stephen A. Morse, PE, LEED AP
- Site Safety Officer, Mr. Zack Leeser

Principal personnel who will be determined once the construction contractor is chosen.

The Professional Engineer (PE) for this project is Mr. Stephen A. Morse of GRANT.

### **5.2 SITE SECURITY**

Site access will be controlled by gated entrances to the fenced property.

### **5.3 WORK HOURS**

The hours for operation of remedial construction will conform to the New York City Department of buildings construction code requirements or according to specific variances issued by that agency.

### **5.4 CONSTRUCTION HEALTH AND SAFETY PLAN**

The Construction Health and Safety Plan (CHASP) is included in Appendix 4. The Site Safety Coordinator will be Mr. Zack Leeser of GRANT. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the HASP. That document will define the specific project contacts for use in case of emergency.

## **5.5 COMMUNITY AIR MONITORING PLAN**

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed 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, for instance, will 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. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed 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. Exceedances of action levels observed during performance

of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

### **VOC Monitoring, Response Levels, and Actions**

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- 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 will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 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.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

## **Particulate Monitoring, Response Levels, and Actions**

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will 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.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ( $\text{mcg}/\text{m}^3$ ) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed  $150 \text{ mcg}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than  $150 \text{ mcg}/\text{m}^3$  above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within  $150 \text{ mcg}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

## **5.6 AGENCY APPROVALS**

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Applicant and contractors are solely responsible for the safe execution of this RAWP and in particular, are responsible for identifying subsurface utilities and safeguarding the structural integrity of any excavations, buildings, utilities and other structures both on- and off-site that may be adversely affected by the work. The Applicant/contractors must obtain any local, state or federal permits or approvals that may be required to perform this work, and are responsible for the implementation of all appropriate

health and safety measures during the performance of this work. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

## **5.7 SITE PREPARATION**

### **Pre-Construction Meeting**

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

### **Mobilization**

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

### **Utility Marker Layouts, Easement Layouts**

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Sub-grade utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under

this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

### **Equipment and Material Staging**

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. The location of proposed material staging areas will be provided prior to construction as part of the Soil Management Plan.

### **Stabilized Construction Entrance**

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

### **Truck Inspection Station**

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC BCP Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

## **5.8 TRAFFIC CONTROL**

Drivers of trucks leaving the NYC BCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is provided will be provided prior to construction in the Soil Management Pan.

## 5.9 DEMOBILIZATION

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (e.g., soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

## 5.10 REPORTING AND RECORD KEEPING

### Daily Reports

Daily reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site that day and an updated record of the total quantity of material imported and exported;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;

- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

### **Record Keeping and Photo-Documentation**

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

### **5.11 COMPLAINT MANAGEMENT**

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

### **5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN**

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;

- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.

### **5.13 DATA USABILITY SUMMARY REPORT**

The primary objective of a Data Usability Summary Report (DUSR) is to determine whether or not data meets the site specific criteria for data quality and data use. The DUSR provides an evaluation of analytical data without third party data validation. The DUSR for post-remedial samples collected during implementation of this RAWP will be included in the Remedial Action Report (RAR).

## **6.0 REMEDIAL ACTION REPORT**

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Recorded Declaration of Covenants and Restrictions.
- Reports and supporting material will be submitted in digital form.

## **Remedial Action Report Certification**

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

*I, Stephen A. Morse, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 498 Leonard Street Site.*

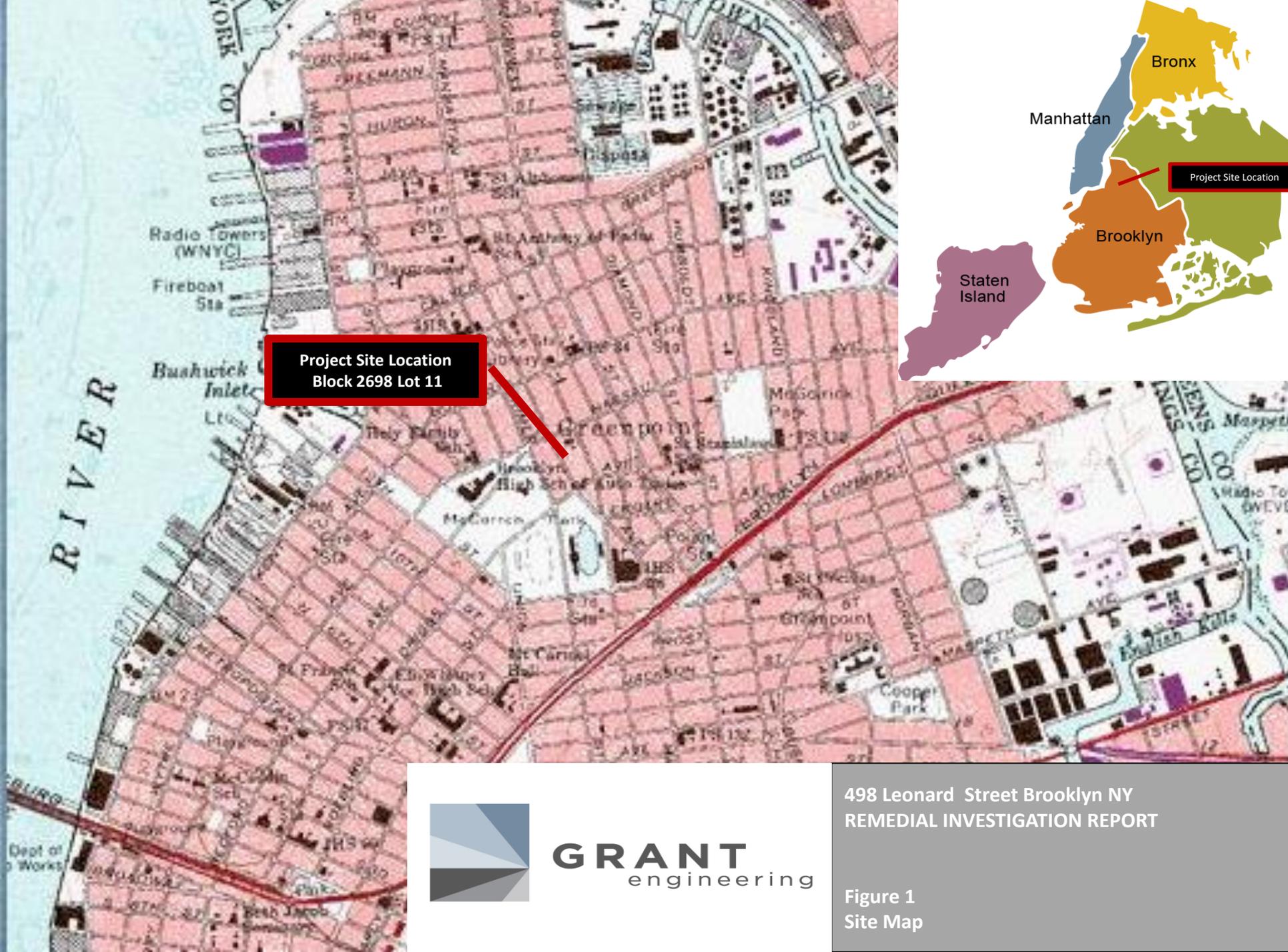
*I certify that the OER-approved Remedial Action Work Plan dated May 2013 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.*

## 7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, an approximate 6 month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	0	3
Remedial Excavation and Shoring	24	21
Footing and Foundation	44	20
Structural Work	52	52
HVAC, Electrical and Plumbing and Interior Renovations	62	26
Site Work and Maintenance	74	26
Inspections	94	5
Punch-list	98	4
Temporary Certificate of Occupancy	100	4
Submit Remedial Action Report	104	1

The entire construction project is estimated to occur from approximately September 2013 to September 2015.



**Project Site Location  
Block 2698 Lot 11**

**Project Site Location**

498 Leonard Street Brooklyn NY  
REMEDIAL INVESTIGATION REPORT



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Figure 1  
Site Map



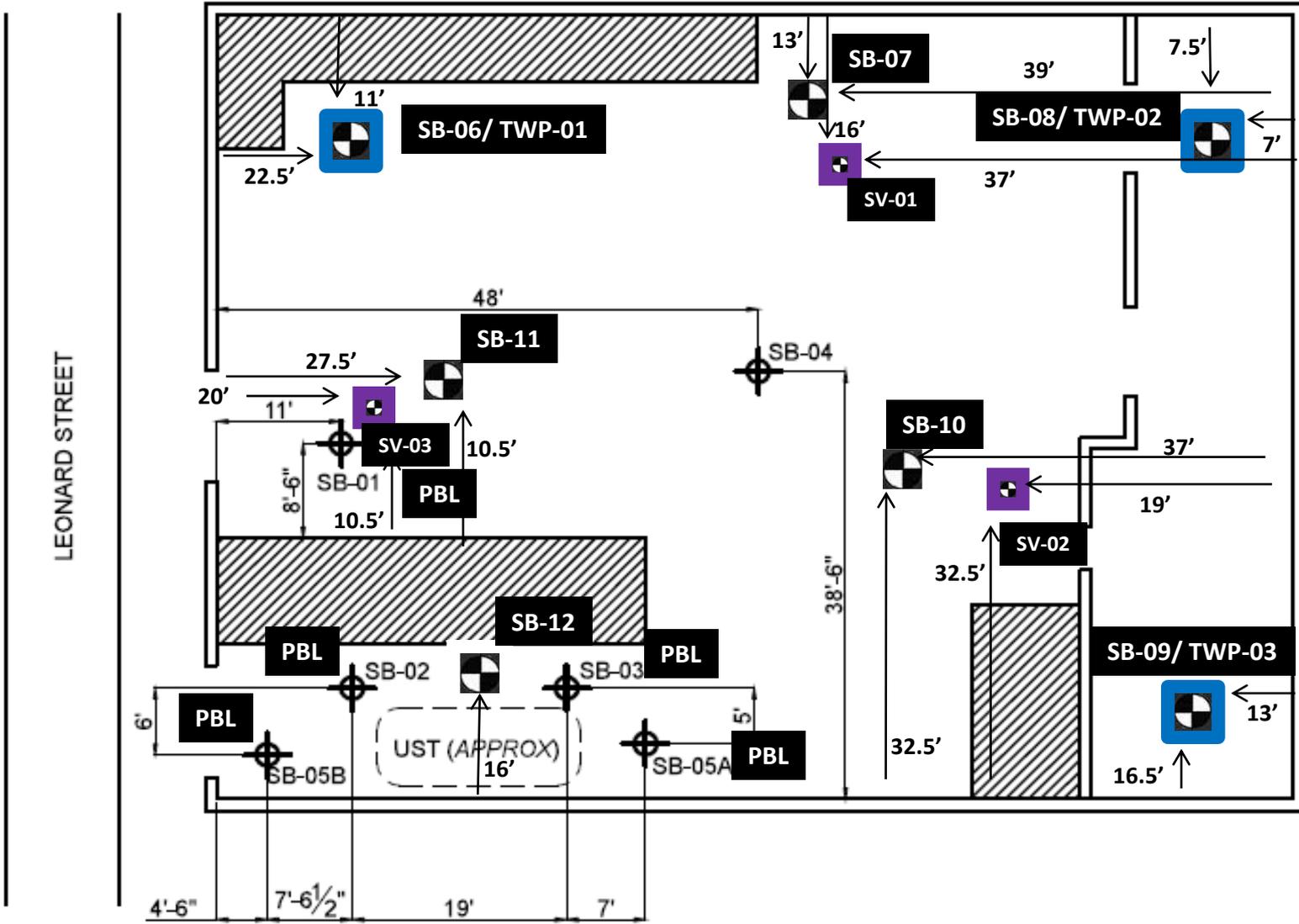
498 Leonard St.



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498 Leonard Street Brooklyn NY  
REMEDIAL INVESTIGATION REPORT

Figure 2  
Site Location Plan



**Legend**

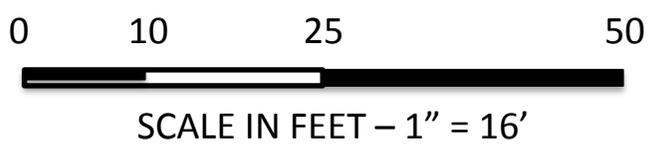
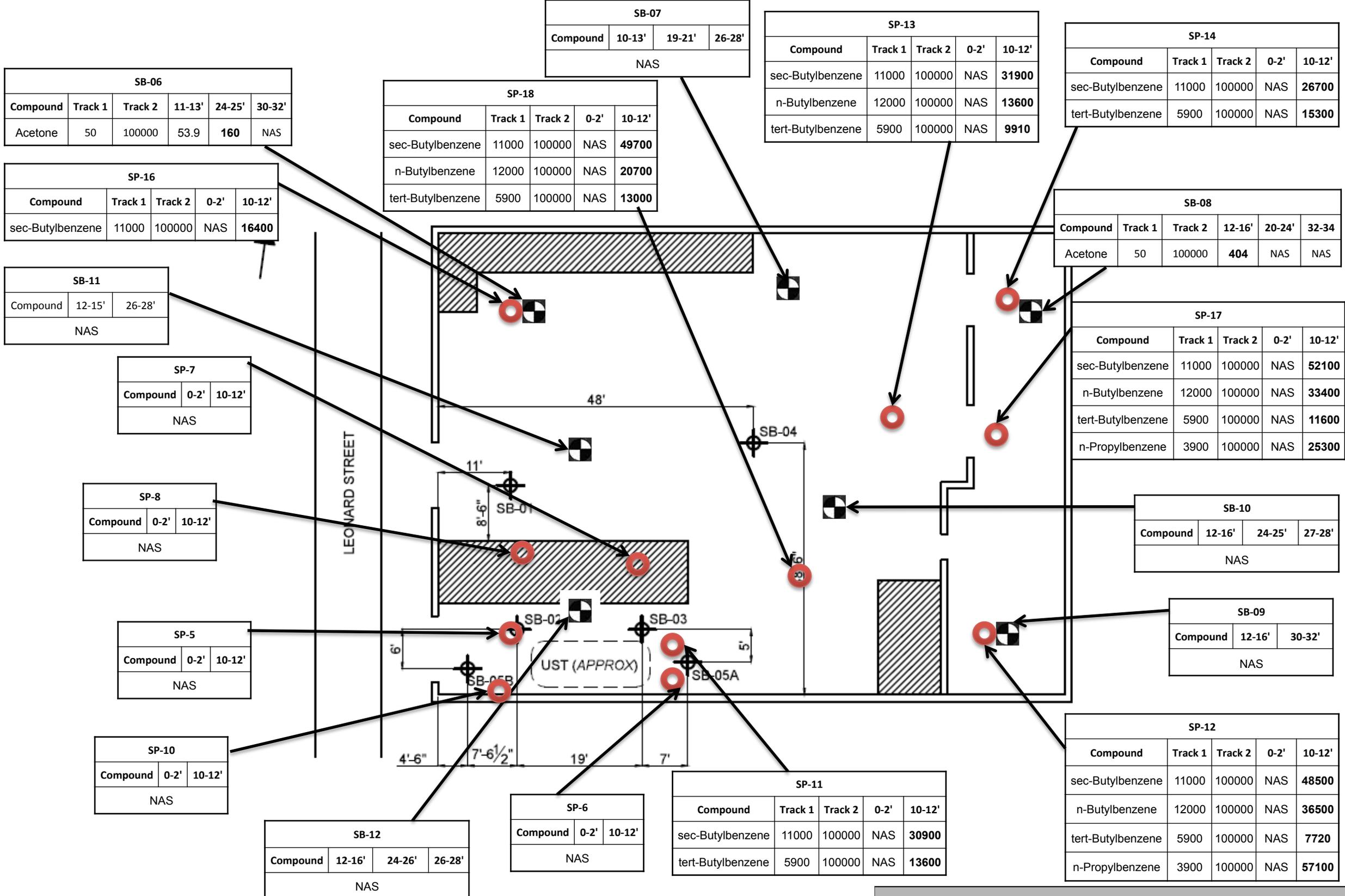
-  Soil Boring and Temporary Well Location
-  Soil Boring
-  Soil Vapor Location
-  Previous Boring Location Completed in February 2013

**PBL** Previous Boring Location Completed in February 2013



498 Leonard Street Brooklyn NY  
BORING LOCATION PLAN  
REMEDIAL INVESTIGATION REPORT

Figure 3



498 Leonard Street Brooklyn NY  
 VOC Contamination in Soil  
 VOCs in ug/kg - See Figure 11 for legend  
 Figure 4

SB-06			
Compound	11-13'	24-25'	30-32'
NAS			

SB-07			
Compound	10-13'	19-21'	26-28'
NAS			

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
Benzo(b)fluoranthene	1000	1000	1250	NAS
Ideno (1,2,3,-cd) Pyrene	500	500	NAS	606

SB-08					
Compound	Track 1	Track 2	12-16'	20-24'	32-34'
Benzo(a)anthracene	1000	1000	11600	NAS	NAS
Benzo(a)pyrene	1000	1000	11700		
Benzo(b)fluoranthene	1000	1000	9840		
Chrysene	1000	3900	9670		
Dibenz(a,h)anthracene	330	330	1900		
Indeno(1,2,3,-cd)pyrene	500	500	5910		

SP-16		
Compound	0-2'	10-12'
NAS		

SP-7					
Compound	Track 1	Track 2	0-2'	6-8'	10-12'
Benzo(a)anthracene	1000	1000	1170	NAS	1320
Benzo(a)pyrene	1000	1000	1100		1490
Benzo(b)fluoranthene	1000	1000	1370		1510
Chrysene	1000	1000	1440		1550
Dibenz(a,h)anthracene	330	330	NAS		959
Indeno(1,2,3,-cd)pyrene	500	500	858	584	1100

SB-11		
Compound	12-15'	26-28'
NAS		

SP-18		
Compound	0-2'	10-12'
NAS		

SP-14		
Compound	0-2'	10-12'
NAS		

SP-17				
Compound	Track 1	Track 2	0-2'	10-12'
Benzo(a)anthracene	1000	1000	NAS	1830
Benzo(a)pyrene	1000	1000		1230
Benzo(b)fluoranthene	1000	1000		1500
Chrysene	1000	3900		1710
Indeno(1,2,3,-cd)pyrene	500	500		558

SB-12			
Compound	12-16'	24-26'	26-28'
NAS			

SP-8		
Compound	0-2'	10-12'
NAS		

SP-5				
Compound	Track 1	Track 2	0-2'	10-12'
Ideno (1,2,3,-cd) Pyrene	500	500	NAS	519

SP-10		
Compound	0-2'	10-12'
NAS		

SP-9				
Compound	Track 1	Track 2	0-2'	10-12'
Ideno (1,2,3,-cd) Pyrene	500	500	NAS	529

SP-6				
Compound	Track 1	Track 2	0-2'	10-12'
Benzo(a)anthracene	1000	1000	NAS	1870
Benzo(a)pyrene	1000	1000		2310
Benzo(b)fluoranthene	1000	1000		2210
Benzo(k)fluoranthene	800	1000		1350
Chrysene	1000	1000		1850
Indeno(1,2,3,-cd)pyrene	500	500	1450	

SP-11				
Compound	Track 1	Track 2	0-2'	6-8'
Dibenz(a,h)anthracene	330	330	NAS	565
Indeno(1,2,3,-cd)pyrene	500	500		830

SP-12		
Compound	0-2'	10-12'
NAS		

SB-10			
Compound	12-16'	24-25'	27-28'
NAS			

SB-09		
Compound	12-16'	30-32'
NAS		



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498 Leonard Street Brooklyn NY  
SVOC Contamination in Soil  
SVOCs in ug/kg – see Figure 11 for legend

Figure 5

SB-11				
Compound	Track 1	Track 2	12-15'	26-28'
Lead	63	400	259	NAS
Mercury	0.18	0.81	2.49	NAS
Zinc	109	10000	124	NAS

SP-16				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	15.1	16.3
Cadmium	2.5	2.5	2.8	3.11
Copper	50	270	211	88.9
Lead	63	400	806	527
Zinc	109	2200	1040	346

SB-06					
Compound	Track 1	Track 2	11-13'	24-25'	30-32'
Copper	50	270	225	NAS	NAS
Lead	63	400	414	NAS	
Mercury	0.18	0.81	3.77	0.3	
Zinc	109	10000	951	NAS	

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	NAS	40.6
Barium	350	350	NAS	879
Copper	50	270	156	407
Lead	63	400	590	2660
Mercury	0.18	0.81	NAS	NAS
Zinc	109	2200	385	2080

SP-14				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	18.2	34.8
Cadmium	2.5	2.5	3.88	3.75
Copper	50	270	127	120
Lead	63	400	1150	3000
Mercury	0.18	0.81	NAS	0.207
Zinc	109	2200	1400	664

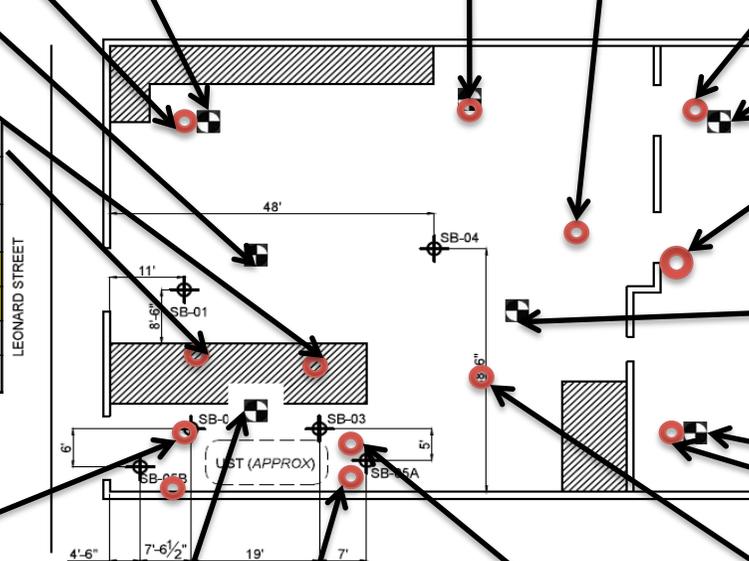
SP-7				
Compound	Track 1	Track 2	0-2'	10-12'
Chromium Trivalent	30	36	43.9	82.4
Arsenic	13	16	59	16.1
Barium	350	350	777	818
Cadmium	2.5	2.5	3.46	NAS
Chromium Hexavalent	1	22	43.9	NAS
Copper	50	270	148	113
Lead	63	400	2020	1650
Manganese	1600	2000	1970	NAS
Mercury	0.18	0.81	25.3	2.67
Zinc	109	2200	500	379

SB-07					
Compound	Track 1	Track 2	10-13'	19-21'	26-28'
Arsenic	13	16	17.6	NAS	NAS
Copper	50	270	87.7		
Lead	63	400	1440		
Zinc	109	10000	174		

SB-08					
Compound	Track 1	Track 2	12-16'	20-24'	32-34'
Lead	63	400	332	NAS	NAS
Zinc	109	10000	135		

SP-17				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	2.98	NAS
Copper	50	270	59.9	
Lead	63	400	188	
Mercury	0.18	0.81	0.52	
Zinc	109	2200	132	

SP-8				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	2.79	NAS
Copper	50	270	NAS	283
Lead	63	400	135	5730
Mercury	0.18	0.81	1.05	0.6657
Zinc	109	2200	290	619



SB-10					
Compound	Track 1	Track 2	12-16'	24-25'	27-28'
Arsenic	13	16	74.5	NAS	NAS
Copper	50	270	160	NAS	NAS
Lead	63	400	605	NAS	NAS
Mercury	0.18	0.81	6.16	31.5	0.19
Zinc	109	10000	211	NAS	NAS

SP-9				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	NAS	2.85
Lead	63	400	400	373
Mercury	0.18	0.81	1.04	1.35
Zinc	109	2200	113	NAS

SB-09				
Compound	Track 1	Track 2	12-16'	30-32'
Lead	63	400	126	NAS

SP-5				
Compound	Track 1	Track 2	0-2'	10-12'
Arsenic	13	16	NAS	41.5
Barium	350	350	NAS	450
Cadmium	2.5	2.5	2.82	2.8
Copper	50	270	NAS	51.4
Lead	63	400	NAS	283
Mercury	0.18	0.81	NAS	5.12
Zinc	109	2200	296	166

SB-12					
Compound	Track 1	Track 2	12-16'	24-26'	26-28'
Arsenic	13	16	23.5	NAS	NAS
Copper	50	270	66.4	NAS	
Lead	63	400	625	NAS	
Mercury	0.18	0.81	2.09	0.18	
Zinc	109	10000	154	NAS	

SP-11					
Compound	Track 1	Track 2	0-2'	6-8'	10-12'
Arsenic	13	16	14.5	NAS	NAS
Cadmium	2.5	2.5	4.02	NAS	2.88
Copper	50	270	77.5	NAS	73.6
Lead	63	400	523	247	467
Mercury	0.18	0.81	0.189	NAS	NAS
Zinc	109	2200	642	269	141

SP-18				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	5	NAS
Copper	50	270	177	NAS
Lead	63	400	919	83.5
Mercury	0.18	0.81	0.524	0.317
Zinc	109	2200	1340	NAS

SP-12				
Compound	Track 1	Track 2	0-2'	10-12'
Cadmium	2.5	2.5	6.85	NAS
Copper	50	270	82.5	NAS
Lead	63	400	626	136
Mercury	0.18	0.81	0.368	NAS
Zinc	109	2200	384	NAS

SP-6				
Compound	Track 1	Track 2	0-2'	10-12'
Barium	350	350	NAS	NAS
Lead	63	400	320	NAS
Mercury	0.18	0.81	0.435	2.10
Zinc	109	2200	538	NAS

0 10 25 50

SCALE IN FEET



498 Leonard Street Brooklyn NY  
Metals Contamination in Soil  
Metals in mg/kg – See Figure 11 for legend

Figure 6

SB-06					
Compound	Track 1	Track 2	11-13'	12-25'	30-32'
4,4'-DDD	3.3	13000	54.9	0.6	NAS

SB-07			
Compound	10-13'	19-21'	26-28'
NAS			

SP-13				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDE	3.3	1800	NAS	16.3

SP-14				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	NAS	8.86
4,4'-DDE	3.3	1800		13

SB-08			
Compound	12-16'	20-24'	32-34'
NAS			

SP-17				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	329	37.8
4,4'-DDE	3.3	1800	35.2	8.71
4,4'-DDT	3.3	1700	9.12	NAS

SB-10			
Compound	12-16'	24-25'	27-28'
NAS			

SB-09		
Compound	12-16'	30-32'
NAS		

SP-12				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	16.6	7.87
4,4'-DDE	3.3	1800	7.01	8.11

SP-16				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	816	NAS
4,4'-DDE	3.3	1800	28.5	
4,4'-DDT	3.3	1700	80.7	
Dieldrin	5	39	255	

SB-11		
Compound	12-15'	26-28'
NAS		

SP-7		
Compound	0-2'	10-12'
NAS		

SP-8		
Compound	0-2'	10-12'
NAS		

SP-5		
Compound	0-2'	10-12'
NAS		

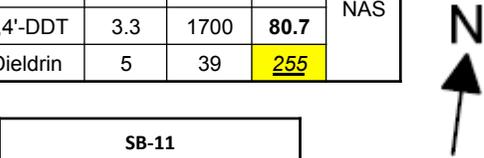
SP-10		
Compound	0-2'	10-12'
NAS		

SP-18				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	8.31	NAS

SP-6				
Compound	Track 1	Track 2	0-2'	10-12'
4,4'-DDD	3.3	2600	NAS	10.4

SP-11					
Compound	Track 1	Track 2	0-2'	6-8'	10-12'
4,4'-DDD	3.3	13000	NAS		
4,4'-DDE	3.3	1800	NAS	6.93	9.79

SB-12			
Compound	12-16'	24-26'	26-28'
NAS			



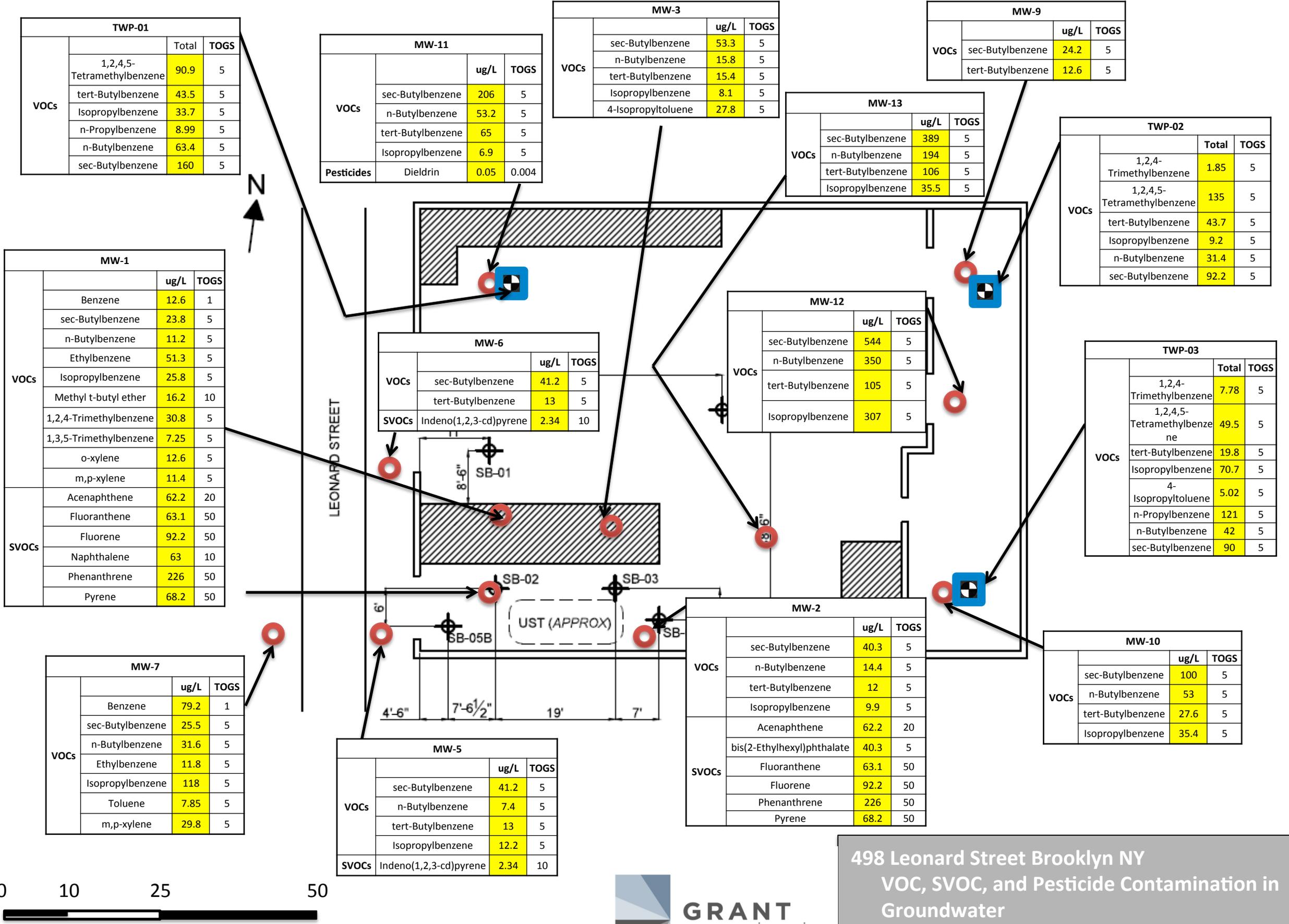
SCALE IN FEET – 1" = 16'



**GRANT**  
engineering

498 Leonard Street Brooklyn NY  
Pesticide Contamination in Soil  
Pesticides in ug/kg – See Figure 11 for legend

Figure 7



TWP-01			
VOCs		Total	TOGS
	1,2,4,5-Tetramethylbenzene	90.9	5
	tert-Butylbenzene	43.5	5
	Isopropylbenzene	33.7	5
	n-Propylbenzene	8.99	5
	n-Butylbenzene	63.4	5
	sec-Butylbenzene	160	5

MW-11			
VOCs		ug/L	TOGS
	sec-Butylbenzene	206	5
	n-Butylbenzene	53.2	5
	tert-Butylbenzene	65	5
	Isopropylbenzene	6.9	5
Pesticides	Dieldrin	0.05	0.004

MW-3			
VOCs		ug/L	TOGS
	sec-Butylbenzene	53.3	5
	n-Butylbenzene	15.8	5
	tert-Butylbenzene	15.4	5
	Isopropylbenzene	8.1	5
	4-Isopropyltoluene	27.8	5

MW-9			
VOCs		ug/L	TOGS
	sec-Butylbenzene	24.2	5
	tert-Butylbenzene	12.6	5

MW-13			
VOCs		ug/L	TOGS
	sec-Butylbenzene	389	5
	n-Butylbenzene	194	5
	tert-Butylbenzene	106	5
	Isopropylbenzene	35.5	5

TWP-02			
VOCs		Total	TOGS
	1,2,4-Trimethylbenzene	1.85	5
	1,2,4,5-Tetramethylbenzene	135	5
	tert-Butylbenzene	43.7	5
	Isopropylbenzene	9.2	5
	n-Butylbenzene	31.4	5
	sec-Butylbenzene	92.2	5

MW-1			
VOCs		ug/L	TOGS
	Benzene	12.6	1
	sec-Butylbenzene	23.8	5
	n-Butylbenzene	11.2	5
	Ethylbenzene	51.3	5
	Isopropylbenzene	25.8	5
	Methyl t-butyl ether	16.2	10
	1,2,4-Trimethylbenzene	30.8	5
	1,3,5-Trimethylbenzene	7.25	5
	o-xylene	12.6	5
	m,p-xylene	11.4	5
	Acenaphthene	62.2	20
	Fluoranthene	63.1	50
	Fluorene	92.2	50
	Naphthalene	63	10
	Phenanthrene	226	50
	Pyrene	68.2	50

MW-6			
VOCs		ug/L	TOGS
	sec-Butylbenzene	41.2	5
	tert-Butylbenzene	13	5
SVOCs	Indeno(1,2,3-cd)pyrene	2.34	10

MW-12			
VOCs		ug/L	TOGS
	sec-Butylbenzene	544	5
	n-Butylbenzene	350	5
	tert-Butylbenzene	105	5
	Isopropylbenzene	307	5

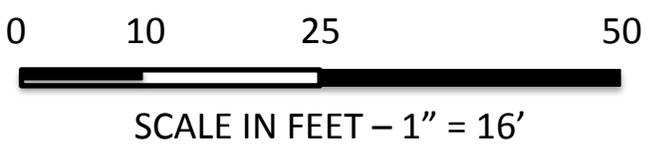
TWP-03			
VOCs		Total	TOGS
	1,2,4-Trimethylbenzene	7.78	5
	1,2,4,5-Tetramethylbenzene	49.5	5
	tert-Butylbenzene	19.8	5
	Isopropylbenzene	70.7	5
	4-Isopropyltoluene	5.02	5
	n-Propylbenzene	121	5
	n-Butylbenzene	42	5
	sec-Butylbenzene	90	5

MW-7			
VOCs		ug/L	TOGS
	Benzene	79.2	1
	sec-Butylbenzene	25.5	5
	n-Butylbenzene	31.6	5
	Ethylbenzene	11.8	5
	Isopropylbenzene	118	5
	Toluene	7.85	5
	m,p-xylene	29.8	5

MW-5			
VOCs		ug/L	TOGS
	sec-Butylbenzene	41.2	5
	n-Butylbenzene	7.4	5
	tert-Butylbenzene	13	5
	Isopropylbenzene	12.2	5
SVOCs	Indeno(1,2,3-cd)pyrene	2.34	10

MW-2			
VOCs		ug/L	TOGS
	sec-Butylbenzene	40.3	5
	n-Butylbenzene	14.4	5
	tert-Butylbenzene	12	5
	Isopropylbenzene	9.9	5
	Acenaphthene	62.2	20
	bis(2-Ethylhexyl)phthalate	40.3	5
	Fluoranthene	63.1	50
	Fluorene	92.2	50
	Phenanthrene	226	50
	Pyrene	68.2	50

MW-10			
VOCs		ug/L	TOGS
	sec-Butylbenzene	100	5
	n-Butylbenzene	53	5
	tert-Butylbenzene	27.6	5
	Isopropylbenzene	35.4	5



498 Leonard Street Brooklyn NY  
 VOC, SVOC, and Pesticide Contamination in  
 Groundwater  
 in ug/kg – See Figure 11 for legend  
 Figure 8

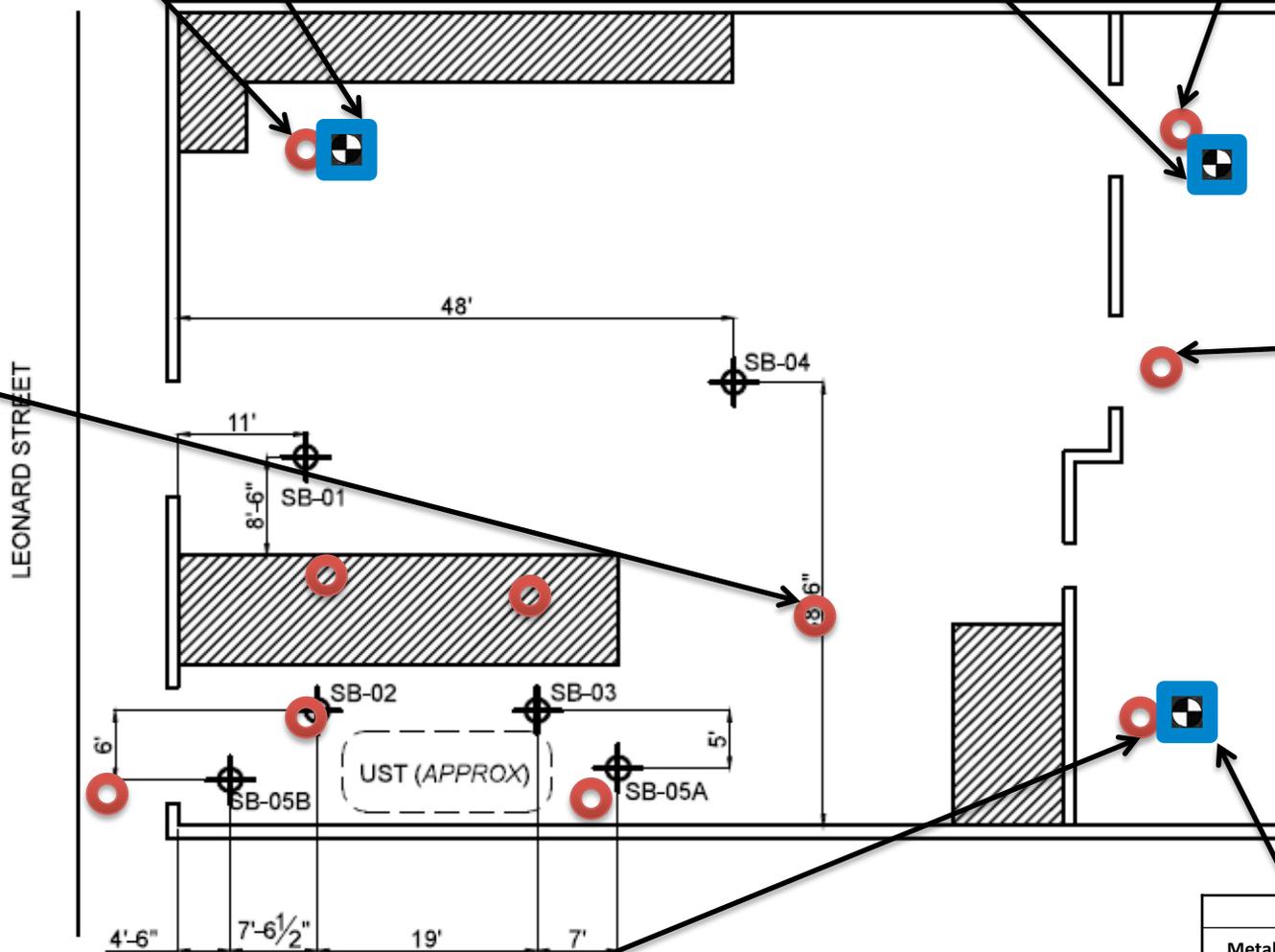
MW-11			
	Total	Dissolved	TOGS
Arsenic	0.183	0.08	0.025
Barium	5.16	1.91	1
Beryllium	0.006	NAS	0.003
Cadmium	0.024		0.005
Chromium	0.126		0.05
Trivalent Chromium	0.126		0.05
Copper	0.881		0.2
Iron	157	88.6	0.3
Lead	8.71	0.77	0.025
Manganese	13.3	3.1	0.3
Mercury	0.0872	NAS	0.0007
Nickel	0.164		0.1
Sodium	62.8	63.9	20
Zinc	6.03	NAS	5

TWP-01				
Metals (Dissolved)		Total	Dissolved	TOGS
	Arsenic	0.027	0.025	0.03
	Mercury	0.003	0.0016	0.007

TWP-02				
Metals (Dissolved)		Total	Dissolved	TOGS
	Lead	0.049	0.036	0.03

MW-9			
	Total	Dissolved	TOGS
Arsenic	0.097	NAS	0.025
Barium	1.89		1
Chromium	0.123		0.05
Trivalent Chromium	0.123		0.05
Copper	0.723		0.2
Iron	125	37.4	0.3
Lead	4.99	0.84	0.025
Magnesium	36.3	NAS	35
Manganese	2.74	2.54	0.3
Mercury	0.187	NAS	0.0007
Nickel	0.114		0.1
Sodium	68.6	68.4	20

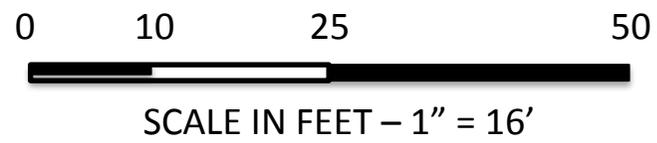
MW-13			
	Total	Dissolved	TOGS
Arsenic	0.991	0.176	0.025
Barium	11.9	1.04	1
Beryllium	0.012	NAS	0.003
Cadmium	0.045		0.005
Chromium	0.71		0.05
Trivalent Chromium	0.71		0.05
Copper	2.54		0.2
Iron	402	44.1	0.3
Lead	51.3	0.062	0.025
Magnesium	35.4	NAS	35
Manganese	5.06	3.7	0.3
Mercury	0.852	NAS	0.0007
Nickel	0.391		0.1
Zinc	8.26		5



MW-12			
	Total	Dissolved	TOGS
Arsenic	0.141	NAS	0.025
Barium	4.26		1
Beryllium	0.007		0.003
Cadmium	0.021		0.005
Chromium	0.122		0.05
Trivalent Chromium	0.122	0.05	
Copper	1.12	0.2	
Iron	179	29.4	0.3
Lead	9.09	NAS	0.025
Manganese	3.2	2.13	0.3
Mercury	0.0694	NAS	0.0007
Nickel	0.168		0.1
Sodium	38.8	36	20

MW-10							
	Total	Dissolved	TOGS		Total	Dissolved	TOGS
Arsenic	1.16	0.193	0	Lead	5	0.044	0.025
Barium	1.74	1.31	1	Magnesium	NAS	36.9	35
Chromium	0.06	NAS	0.1	Manganese	1.7	5.05	0.3
Trivalent Chromium	0.06		0.1	Mercury	172	NAS	7E-04
Copper	0.43		0.2	Nickel	0.1	NAS	0.1
Iron	77.9	59.6	0.3	Sodium	109	120	20

TWP-03				
Metals (Dissolved)		Total	Dissolved	TOGS
	Lead	0.086	-	0.03



498 Leonard Street Brooklyn NY  
 Metals Contamination in Groundwater  
 Metals in mg/kg – See Figure 11 for legend  
 Figure 9

SV-3		
VOCs	ug/m3	BS-Indoor Air
1,1,1-Trichloroethane	16	0.25
Acetone	14	10
Chloroform	33	0.25
Ethyl Benzene	12	0.41
o-Xylene	19	0.39
p- & m- Xylenes	48	0.5
Toluene	29	3.5

SV-01			
VOC	Result	DOH	DOH Matrix Recommendation
1,1,1-Trichloroethane	ND	<100	NFA / Reasonable Action
Carbon Tetrachloride		<5	NFA / Reasonable Action
Tetrachloroethylene	20	<100	NFA / Reasonable Action
Trichloroethylene	ND	<5	NFA / Reasonable Action

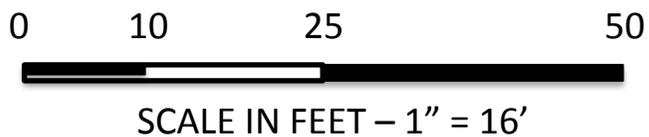
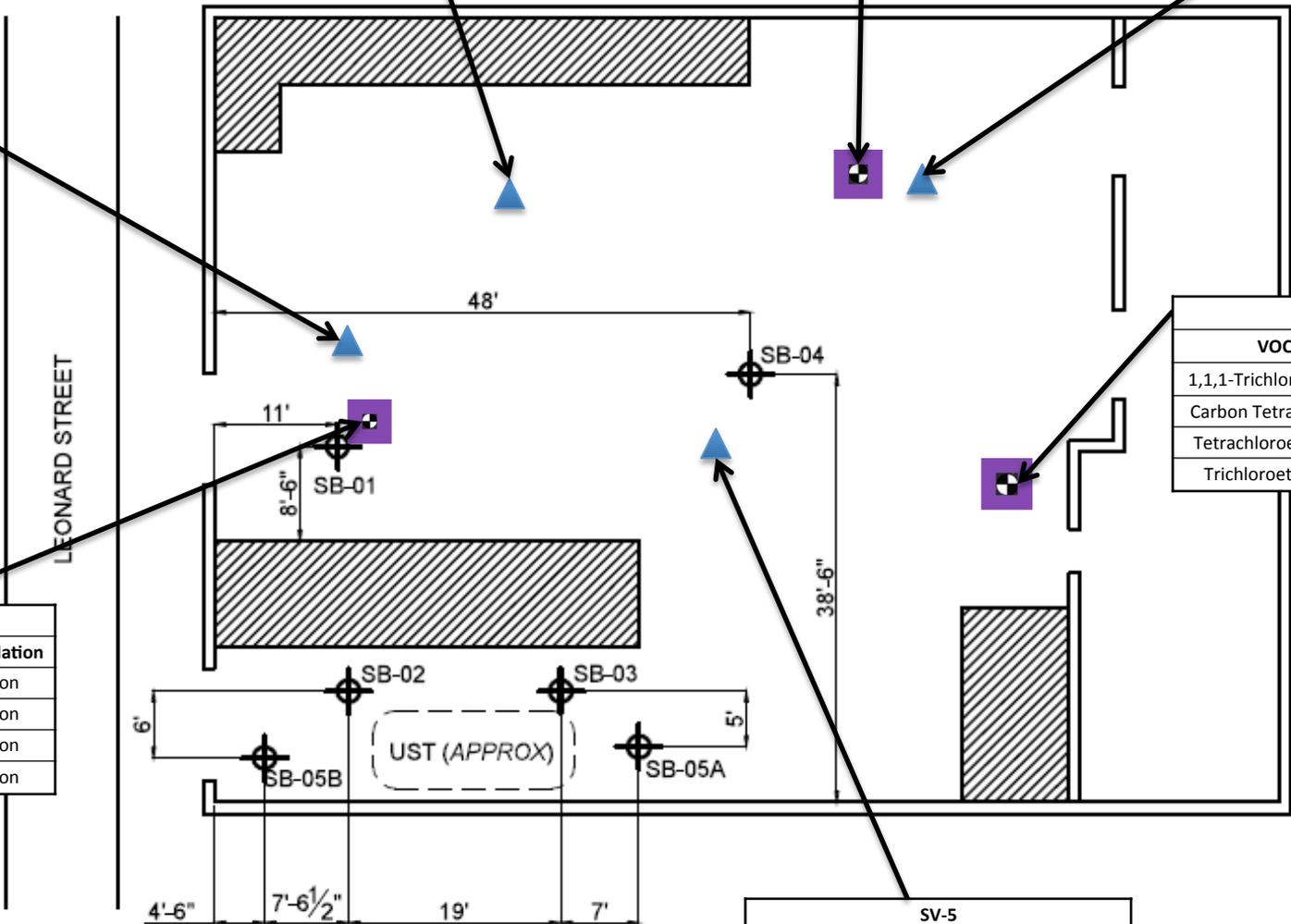
SV-2		
VOCs	ug/m3	BS-Indoor Air
1,1,1-Trichloroethane	24	0.25
1,2,4-Trimethylbenzene	61	0.69
1,3,5-Trimethylbenzene	24	0.27
Acetone	17	10
Ethyl Benzene	12	0.41
o-Xylene	25	0.39
p- & m- Xylenes	53	0.5
Tetrachloroethylene	30	0.25
Toluene	22	3.2

SV-4		
VOCs	ug/m3	BS-Indoor Air
1,1,1-Trichloroethane	14	0.25
Acetone	26	10
Ethyl Benzene	11	0.41
o-Xylene	16	0.39
p- & m- Xylenes	43	0.5
Toluene	32	3.5

SV-02			
VOC	Result	DOH	DOH Matrix Recommendation
1,1,1-Trichloroethane	ND	<100	NFA / Reasonable Action
Carbon Tetrachloride		<5	NFA / Reasonable Action
Tetrachloroethylene		<100	NFA / Reasonable Action
Trichloroethylene		<5	NFA / Reasonable Action

SV-03			
VOC	Result	DOH	DOH Matrix Recommendation
1,1,1-Trichloroethane	ND	<100	NFA / Reasonable Action
Carbon Tetrachloride		<5	NFA / Reasonable Action
Tetrachloroethylene		<100	NFA / Reasonable Action
Trichloroethylene		<5	NFA / Reasonable Action

SV-5		
VOCs	ug/m3	BS-Indoor Air
Acetone	500	10



498 Leonard Street Brooklyn NY  
 VOCs Contamination in Soil Vapor  
 VOCs in ug/kg – See Figure 11 for legend  
 Figure 10

## FIGURE 11 – LEGEND FOR FIGURES 4 THROUGH 10

Track 1 = NYSDEC Unrestricted Use Soil Cleanup Objectives

Track 2 = NYSDEC Restricted Use Soil Cleanup Objectives

Soil values that are **bold** exceed Track 1 SCOs

Soil values that are underlined, highlighted, and italicized exceed Track 2 SCOs

Groundwater values that are highlighted exceed TOGS Groundwater Quality Standards (GQS)

Soil Vapor values that are **bold** do not exceed 2006 NYSDOH Guidance Levels

Soil Vapor values that are highlighted exceed Background Standards for Indoor Air

 GRANT engineering Soil Boring locations

 GRANT engineering Temporary Well Point (TWP) locations

 GRANT engineering Soil Vapor test points

 Hydro Tech Environmental Corp. soil boring or monitoring well locations – sampled October 2012

 Hydro Tech Environmental Corp. test points – sampled October 2012

NAS = Not Above Standard

ND = Not Detected

NFA = No Further Action

Table 3  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix	Compound CASNumber	NYSDEC Part 375 Unrestricted Use SOs Soil	NYSDEC Part 375 Restricted Residential Use SOs Soil	SB-06A 11-13' 1304263-2 04/23/2013 Soil		SB-06B 24-25' 1304263-3 04/23/2013 Soil		SB-06C 30-32' 1304263-4 04/23/2013 Soil		SB-07A 10-13' 1304262-1 04/22/2013 Soil		SB-07B 19-21' 1304262-2 04/22/2013 Soil		SB-07C 26-28' 1304262-3 04/22/2013 Soil		SB-08A 12-16' 1304262-4 04/22/2013 Soil		SB-08B 20-24' 1304262-5 04/22/2013 Soil		SB-08C 32-34' 1304262-6 04/22/2013 Soil		SB-09A 12-16' 1304262-7 04/22/2013 Soil		SB-09B 30-32' 1304262-8 04/22/2013 Soil		SB-10A 12-16' 1304262-9 04/23/2013 Soil		SB-10B 24-25' 1304262-10 04/23/2013 Soil		SB-10C 27-28' 1304263-1 04/23/2013 Soil		SB-11A 12-15' 1304263-5 04/23/2013 Soil		SB-11B 26-28' 1304263-6 04/23/2013 Soil			
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q																								
<b>Volatile Organics, TCL (Target Compound List)</b>				ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry			
Acetone	67-64-1	50	100000	53.9	U	160	U	8.37	U	46.2	U	17.5	U	7.63	U	404	U	8.23	U	8.71	U	48.6	U	7.97	U	43.5	U	26.9	U	7.63	U	45.6	U	8.37	U		
Carbon Tetrachloride	56-23-5	760	2400	14.5	U	2.41	U	2.24	U	12.4	U	4.69	U	2.05	U	13.1	U	2.21	U	2.33	U	13	U	2.15	U	11.7	U	7.2	U	2.05	U	2.14	U	12.2	U	2.24	U
Chloroform	67-66-3	370	49000	16.1	U	2.69	U	2.5	U	13.8	U	5.23	U	2.28	U	14.6	U	2.46	U	2.61	U	14.5	U	2.38	U	13	U	8.04	U	2.28	U	13.6	U	2.5	U		
Benzene	71-43-2	60	4800	14.9	U	2.49	U	2.32	U	12.8	U	4.84	U	2.11	U	13.5	U	2.28	U	2.41	U	16.6	J	2.21	U	24.2	J	7.44	U	2.11	U	12.6	U	2.32	U		
1,1,1-Trichloroethane	71-55-6	680	100000	14.5	U	2.42	U	2.26	U	12.5	U	4.71	U	2.06	U	13.2	U	2.22	U	2.35	U	13.1	U	2.15	U	11.7	U	7.24	U	2.06	U	2.15	U	12.3	U	2.26	U
Bromomethane	74-83-9	~	~	16.1	U	2.67	U	2.49	U	13.8	U	5.21	U	2.27	U	14.6	U	2.45	U	2.59	U	14.5	U	2.37	U	12.9	U	8	U	2.27	U	13.6	U	2.49	U		
Chloromethane	74-87-3	~	~	11.9	U	1.98	U	1.85	U	10.2	U	3.86	U	1.68	U	10.8	U	1.82	U	1.92	U	10.7	U	1.76	U	9.6	U	5.93	U	1.68	U	10.1	U	1.85	U		
Dibromomethane	74-95-3	~	~	12.8	U	2.13	U	1.98	U	11	U	4.14	U	1.81	U	11.6	U	1.95	U	2.06	U	11.5	U	1.89	U	10.3	U	6.37	U	1.81	U	10.8	U	1.98	U		
Bromochloromethane	74-97-5	~	~	15.8	U	2.63	U	2.46	U	13.6	U	5.13	U	2.24	U	14.3	U	2.42	U	2.55	U	14.3	U	2.34	U	12.8	U	7.88	U	2.24	U	2.34	U	2.46	U		
Chloroethane	75-00-3	~	~	16	U	2.66	U	2.48	U	13.7	U	5.18	U	2.26	U	14.5	U	2.44	U	2.58	U	14.4	U	2.36	U	12.9	U	7.96	U	2.26	U	13.5	U	2.48	U		
Vinyl Chloride	75-01-4	20	900	17.6	U	2.93	U	2.73	U	15.1	U	5.7	U	2.49	U	15.9	U	2.68	U	2.84	U	15.8	U	2.6	U	14.2	U	8.76	U	2.49	U	14.9	U	2.73	U		
Methylene Chloride	75-09-2	50	100000	15	U	2.5	U	2.33	U	12.9	U	4.87	U	2.12	U	13.6	U	2.29	U	2.43	U	13.5	U	2.22	U	12.1	U	7.48	U	2.12	U	12.7	U	2.33	U		
Carbon disulfide	75-15-10	2700	100000	10.5	U	1.74	U	1.62	U	8.97	U	9.95	J	1.48	U	9.48	U	1.6	U	1.69	U	9.43	U	3.12	J	24	J	5.21	U	1.48	U	13.2	U	1.62	U		
Bromoform	75-25-2	~	~	7.27	U	1.21	U	1.13	U	6.23	U	2.36	U	1.03	U	6.59	U	1.11	U	1.17	U	6.55	U	1.07	U	5.86	U	3.62	U	1.03	U	6.14	U	1.13	U		
Bromodichloromethane	75-27-4	~	~	9.91	U	1.65	U	1.54	U	8.49	U	3.21	U	1.4	U	8.98	U	1.51	U	1.6	U	8.93	U	1.46	U	7.99	U	4.94	U	1.4	U	8.37	U	1.54	U		
1,1-Dichloroethane	75-34-3	270	26000	12.8	U	2.13	U	1.98	U	11	U	4.14	U	1.81	U	11.6	U	1.95	U	2.06	U	11.5	U	1.89	U	10.3	U	6.37	U	1.81	U	10.8	U	1.98	U		
1,1-Dichloroethene	75-35-4	330	100000	15.1	U	2.51	U	2.34	U	12.9	U	4.9	U	2.14	U	13.7	U	2.31	U	2.44	U	13.6	U	2.23	U	12.2	U	7.52	U	2.14	U	12.8	U	2.34	U		
Tertiary butyl alcohol	75-65-0	~	~	121	U	20.1	U	18.7	U	103	U	39.1	U	17.1	U	109	U	18.4	U	19.5	U	109	U	17.8	U	97.2	U	60.1	U	17.1	U	102	U	18.7	U		
Trichlorofluoromethane	75-69-4	~	~	15.3	U	2.54	U	2.37	U	13.1	U	4.95	U	2.16	U	13.8	U	2.33	U	2.46	U	13.8	U	2.25	U	12.3	U	7.6	U	2.16	U	12.9	U	2.37	U		
Dichlorodifluoromethane	75-71-8	~	~	8.31	U	1.38	U	1.29	U	7.12	U	2.69	U	1.18	U	7.53	U	1.27	U	1.34	U	7.49	U	1.23	U	6.7	U	4.14	U	1.18	U	7.02	U	1.29	U		
1,1,2-Trichlorotrifluoroethane (113 Freon)	76-13-1	6000	100000	13.7	U	2.29	U	2.13	U	11.8	U	4.45	U	1.94	U	12.5	U	2.1	U	2.22	U	12.4	U	2.03	U	11.1	U	6.85	U	1.94	U	11.6	U	2.13	U		
1,2-Dichloropropane	78-87-5	~	~	16.1	U	2.69	U	2.5	U	13.8	U	5.23	U	2.28	U	14.6	U	2.46	U	2.61	U	14.5	U	2.38	U	13	U	8.04	U	2.28	U	13.6	U	2.5	U		
2-Butanone	78-93-3	300	100000	29	U	4.83	U	4.5	U	24.9	U	9.4	U	4.1	U	116	U	4.43	U	4.68	U	26.1	U	4.28	U	23.4	U	14.4	U	4.1	U	24.5	U	4.5	U		
1,1,2-Trichloroethane	79-00-5	~	~	15.3	U	2.54	U	2.37	U	13.1	U	4.95	U	2.16	U	13.8	U	2.33	U	2.46	U	13.8	U	2.25	U	12.3	U	7.6	U	2.16	U	12.9	U	2.37	U		
Trichloroethene	79-01-6	470	21000	13.9	U	2.31	U	2.16	U	11.9	U	4.51	U	1.97	U	12.6	U	2.12	U	2.24	U	12.5	U	2.05	U	11.2	U	6.93	U	1.97	U	11.7	U	2.16	U		
1,1,2,2-Tetrachloroethane	79-34-5	600	35000	15.9	U	2.65	U	2.47	U	13.6	U	5.15	U	2.25	U	14.4	U	2.43	U	2.57	U	14.3	U	2.35	U	12.8	U	7.92	U	2.25	U	13.4	U	2.47	U		
1,2,3-Trichlorobenzene	87-61-6	20000	~	14.1	U	2.34	U	2.18	U	12.1	U	4.56	U	1.99	U	12.7	U	2.15	U	2.27	U	12.7	U	2.08	U	11.3	U	7	U	1.99	U	11.9	U	2.18	U		
Hexachlorobutadiene	87-68-3	~	~	14.4	U	2.39	U	2.23	U	12.3	U	4.66	U	2.03	U	13	U	2.2	U	2.32	U	13	U	2.12	U	11.6	U	7.16	U	2.03	U	12.1	U	2.23	U		
Naphthalene	91-20-3	12000	100000	11.1	U	1.85	U	1.72	U	9.52	U	3.6	U	1.57	U	10.1	U	1.7	U	1.79	U	708	U	1.64	U	46.4	U	1.57	U	9.38	U	1.72	U				
p-xylene	95-47-6	~	~	17.5	U	2.91	U	2.72	U	15	U	6.17	U	15.9	U	6.72	U	7.03	U	66.1	U	2.58	U	14.1	U	8.72	U	2.47	U	14.8	U	2.72	U				
2-Chlorotoluene	95-49-8	~	~	18.5	U	3.07	U	2.86	U	15.8	U	5.98	U	2.61	U	16.7	U	2.82	U	2.98	U	16.6	U	16.7	U	14.9	U	9.19	U	2.61	U	15.6	U	2.86	U		
1,2-Dichlorobenzene	95-50-1	1100	100000	16.6	U	2.77	U	2.58	U	14.2	U	5.39	U	2.35	U	15.1	U	2.54	U	2.68	U	15	U	2.45	U	13.4	U	8.28	U	2.35	U	14	U	2.58	U		
1,2,4-Trimethylbenzene	95-63-6	3600	52000	17.4	U	2.9	U	2.7	U	14.9	U	5.65	U	2.46	U	15.8	U	2.66	U	2.81	U	15	U	2.57	U	14	U	8.68	U	2.46	U	14.7	U	2.7	U		
1,2,4,5-Tetramethylbenzene	95-93-2	~	~	1320	E	28.5	U	1.96	U	9.56	U	4.09	U	6.35	U	532	U	7.37	U	7.73	U	2130	E	1.86	U	1440	E	36.2	U	1.79	U	1490	E	1.96	U		
1,2-Dibromo-3-chloropropane	96-12-8	~	~	8.07																																	

Table 3  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix	Compound	CASNumber	NYSDEC Part 375 Unrestricted Use Soils	NYSDEC Part 375 Restricted Residential Use Soils	SB-06A 11-13' 1304263-2 04/23/2013		SB-06B 24-25' 1304263-3 04/23/2013		SB-06C 30-32' 1304263-4 04/23/2013		SB-07A 10-13' 1304262-1 04/22/2013		SB-07B 19-21' 1304262-2 04/22/2013		SB-07C 26-28' 1304262-3 04/22/2013		SB-08A 12-16' 1304262-4 04/22/2013		SB-08B 20-24' 1304262-5 04/22/2013		SB-08C 32-34' 1304262-6 04/22/2013		SB-09A 12-16' 1304262-7 04/22/2013		SB-09B 30-32' 1304262-8 04/22/2013		SB-10A 12-16' 1304262-9 04/22/2013		SB-10B 24-25' 1304262-10 04/23/2013		SB-10C 27-28' 1304263-1 04/23/2013		SB-11A 12-15' 1304263-5 04/23/2013		SB-11B 26-28' 1304263-6 04/23/2013				
					Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q																							
<b>Semi-Volatiles, EPA TCL List</b>																																							
1,2,4-Trichlorobenzene	120-82-1	~	~	63.1	U	52.4	U	48.9	U	54.1	U	102	U	44.5	U	57.2	U	48.1	U	51	U	56.9	U	46.7	U	50.8	U	157	U	44.8	U	53.3	U	48.9	U				
1,2-Dichlorobenzene	95-50-1	1100	100000	51.1	U	42.4	U	39.7	U	43.8	U	82.9	U	46.3	U	46.3	U	38.9	U	41.3	U	46.1	U	37.8	U	41.2	U	127	U	36.3	U	43.2	U	39.6	U				
1,2-Diphenylhydrazine	122-66-7	~	~	57.8	U	48	U	44.9	U	49.6	U	93.8	U	40.8	U	52.4	U	44	U	46.7	U	52.2	U	42.8	U	46.6	U	144	U	41	U	48.9	U	44.8	U				
1,3-Dichlorobenzene	541-73-1	2400	49000	51.6	U	42.8	U	40	U	44.2	U	83.7	U	36.4	U	46.7	U	39.3	U	41.7	U	46.5	U	38.2	U	41.6	U	129	U	36.6	U	43.6	U	40	U				
1,4-Dichlorobenzene	106-46-7	1800	13000	45.8	U	38.1	U	35.6	U	39.3	U	74.4	U	32.4	U	41.5	U	34.9	U	37	U	41.4	U	33.9	U	36.9	U	114	U	32.5	U	38.7	U	35.5	U				
2,3,4,6-Tetrachlorophenol	58-90-2	~	~	58	U	48.1	U	45	U	49.7	U	94	U	40.9	U	52.5	U	44.2	U	46.8	U	52.3	U	42.9	U	46.7	U	145	U	41.2	U	49	U	44.9	U				
2,4,5-Trichlorophenol	95-95-4	100	100000	24.1	U	20	U	18.7	U	20.7	U	39.1	U	17	U	21.9	U	18.4	U	19.5	U	21.8	U	17.8	U	19.4	U	60.2	U	17.1	U	20.4	U	18.7	U				
2,4,6-Trichlorophenol	88-06-2	10000	~	47.8	U	39.7	U	37.1	U	41	U	77.5	U	33.7	U	43.3	U	36.4	U	38.6	U	43.1	U	35.3	U	38.5	U	119	U	33.9	U	40.4	U	37	U				
2,4-Dichlorophenol	120-83-2	~	~	48.2	U	40.1	U	37.4	U	41.4	U	41	U	34	U	43.7	U	36.7	U	39	U	43.5	U	35.7	U	38.9	U	120	U	34.2	U	40.8	U	37.4	U				
2,4-Dimethylphenol	105-67-9	~	~	51.8	U	43	U	40.1	U	44.4	U	83.9	U	36.5	U	46.9	U	39.4	U	41.8	U	46.7	U	38.3	U	41.7	U	129	U	36.7	U	43.7	U	40.1	U				
2,4-Dinitrophenol	51-28-5	~	~	1600	U	1330	U	1240	U	1370	U	2590	U	1130	U	1450	U	1220	U	1290	U	1440	U	1180	U	1290	U	3980	U	1130	U	1350	U	1240	U				
2,4-Dinitrotoluene	121-14-2	~	~	52.1	U	43.2	U	40.4	U	44.7	U	84.5	U	36.8	U	47.2	U	39.7	U	42.1	U	47	U	38.5	U	42	U	130	U	37	U	44	U	40.3	U				
2,6-Dinitrotoluene	606-20-2	~	~	46.6	U	38.7	U	36.2	U	40	U	75.6	U	32.9	U	42.3	U	35.5	U	37.7	U	42.1	U	34.5	U	37.6	U	116	U	33.1	U	39.4	U	36.1	U				
2-Chloronaphthalene	91-58-7	~	~	47.3	U	39.3	U	36.7	U	40.5	U	76.7	U	33.4	U	42.8	U	36	U	38.2	U	42.7	U	35	U	38.1	U	118	U	33.6	U	39.9	U	36.6	U				
2-Chlorophenol	95-57-8	800	100000	60.7	U	50.4	U	47.1	U	52.1	U	98.4	U	42.8	U	55	U	46.2	U	49	U	54.8	U	44.9	U	48.9	U	151	U	43.1	U	51.3	U	47	U				
2-Methylnaphthalene	91-57-6	410	410	49.8	U	41.4	U	38.7	U	42.7	U	80.8	U	35.2	U	45.2	U	38	U	40.3	U	45	U	36.9	U	40.2	U	124	U	35.4	U	42.1	U	38.6	U				
2-Methylphenol (o cresol)	95-48-7	330	100000	46.2	U	38.3	U	35.8	U	39.6	U	74.9	U	32.6	U	41.8	U	35.2	U	37.3	U	41.6	U	34.2	U	37.2	U	115	U	32.8	U	39	U	35.8	U				
2-Nitroaniline	88-74-4	~	~	20.9	U	17.4	U	16.2	U	17.9	U	33.9	U	14.8	U	19	U	15.9	U	16.9	U	18.9	U	15.5	U	16.9	U	52.2	U	14.9	U	17.7	U	16.2	U				
2-Nitrophenol	88-75-5	300	~	21.1	U	17.5	U	16.4	U	18.1	U	34.2	U	14.9	U	19.1	U	16.1	U	17	U	19	U	15.6	U	17	U	52.6	U	15	U	17.8	U	16.3	U				
3,4-Methylphenol	100-01-6	~	~	52.6	U	43.6	U	40.8	U	45.1	U	85.2	U	37.1	U	47.6	U	40	U	42.5	U	47.4	U	35.9	U	42.3	U	131	U	37.3	U	44.4	U	40.7	U				
3,3'-Dichlorobenzidine	91-94-1	~	~	101	U	84.1	U	78.6	U	86.8	U	164	U	71.5	U	91.8	U	77.1	U	81.8	U	91.4	U	74.9	U	81.6	U	253	U	71.9	U	85.6	U	78.5	U				
3-Nitroaniline	99-09-2	~	~	77.6	U	64.5	U	60.2	U	66.6	U	126	U	54.8	U	70.3	U	59.1	U	62.7	U	70	U	57.4	U	62.5	U	194	U	55.1	U	65.6	U	60.1	U				
4,6-Dinitro-2-methylphenol	534-52-1	~	~	127	U	106	U	98.6	U	109	U	206	U	89.7	U	115	U	96.8	U	103	U	115	U	94.1	U	102	U	317	U	90.2	U	107	U	98.5	U				
4-Bromophenyl phenyl ether	101-55-3	~	~	45.8	U	38.1	U	35.6	U	39.3	U	74.4	U	32.4	U	41.5	U	34.9	U	37	U	41.4	U	33.9	U	36.9	U	114	U	32.5	U	38.7	U	35.5	U				
4-Chloro-3-methylphenol	59-50-7	~	~	46	U	38.2	U	35.7	U	39.5	U	74.6	U	32.5	U	41.7	U	35	U	37.2	U	41.5	U	34	U	37.1	U	115	U	32.7	U	38.9	U	35.6	U				
4-Chloroaniline	106-47-8	220	100000	69	U	57.3	U	53.5	U	59.2	U	112	U	48.7	U	62.5	U	52.6	U	55.7	U	62.2	U	51.1	U	55.6	U	172	U	49	U	58.3	U	53.5	U				
4-Chlorophenyl phenyl ether	7005-72-3	~	~	34	U	28.2	U	26.4	U	29.2	U	55.2	U	24	U	30.8	U	25.9	U	27.5	U	30.7	U	25.2	U	27.4	U	84.9	U	24.1	U	28.7	U	26.4	U				
4-Nitroaniline	100-02-7	~	~	61.2	U	50.8	U	47.5	U	52.5	U	99.2	U	43.2	U	55.4	U	46.6	U	49.4	U	55.2	U	45.3	U	49.3	U	153	U	43.4	U	51.7	U	47.4	U				
4-Nitrophenol	56-57-5	100	~	60.7	U	50.4	U	47.1	U	52.1	U	98.4	U	42.8	U	55	U	46.2	U	49	U	54.8	U	44.9	U	48.9	U	151	U	43.1	U	51.3	U	47	U				
Acenaphthene	83-32-9	20000	100000	41.1	U	34.1	U	31.8	U	35.2	U	66.6	U	29	U	37.2	U	31.3	U	33.2	U	37	U	30.4	U	33.1	U	102	U	29.1	U	34.7	U	31.8	U				
Acenaphthylene	208-96-8	100000	100000	46.6	U	38.7	U	36.2	U	40	U	75.6	U	32.9	U	47.9	U	35.5	U	37.7	U	42.1	U	34.5	U	37.6	U	116	U	33.1	U	39.4	U	36.1	U				
Aniline	62-53-3	330	100000	51.4	U	42.7	U	39.9	U	44.1	U	83.4	U	36.3	U	46.6	U	39.2	U	41.5	U	46.4	U	38.1	U	41.4	U	128	U	36.5	U	43.5	U	39.9	U				
Anthracene	120-12-7	100000	100000	56.9	U	47.2	U	44.1	U	48.8	U	92.2	U	40.1	U	72.8	U	43.3	U	45.9	U	51.3	U	42.1	U	45.8	U	142	U	40.4	U	48	U	44.1	U				
Benzidine	92-87-5	~	~	1350	U	1120	U	1050	U	1160	U	2200	U	956	U	1230	U	1030	U	2200	U	1220	U	1000	U	1090	U	3380	U	961	U	1140	U	1050	U				
Benzo(a)anthracene	56-55-3	1000	1000	75.7	U	62.9	U	58.7	U	64.9	U	123	U	53.4	U	72.0	U	57.7	U	61.2	U	68.3	U	56	U	61	U	189	U	53.7	U	64	U	58.7	U				
Benzo(a)pyrene	50-32-8	1000	1000																																				

Table 3  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID	LabID	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Residential Use SCOs	SB-06A 11-13' 1304263-2 04/23/2013	SB-06B 24-25' 1304263-3 04/23/2013	SB-06C 30-32' 1304263-4 04/23/2013	SB-07A 10-13' 1304262-1 04/22/2013	SB-07B 19-21' 1304262-2 04/22/2013	SB-07C 26-28' 1304262-3 04/22/2013	SB-08A 12-16' 1304262-4 04/22/2013	SB-08B 20-24' 1304262-5 04/22/2013	SB-08C 32-34' 1304262-6 04/22/2013	SB-09A 12-16' 1304262-7 04/22/2013	SB-09B 30-32' 1304262-8 04/22/2013	SB-10A 12-16' 1304262-9 04/23/2013	SB-10B 24-25' 1304262-10 04/23/2013	SB-10C 27-28' 1304263-1 04/23/2013	SB-11A 12-15' 1304263-5 04/23/2013	SB-11B 26-28' 1304263-6 04/23/2013	
ClientMatrix	Compound	CASNumber	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
	<b>PCBs, Pesticides, Herbicides EPA 8082/8081/8321 List</b>																			
	Aroclor 1016	12674-11-2	~		~		~		~		~		~		~		~		~	
	Aroclor 1221	11104-28-2	~		~		~		~		~		~		~		~		~	
	Aroclor 1232	11141-16-5	~		~		~		~		~		~		~		~		~	
	Aroclor 1242	53469-21-9	~		~		~		~		~		~		~		~		~	
	Aroclor 1248	12672-29-6	~		~		~		~		~		~		~		~		~	
	Aroclor 1254	11097-69-1	~		~		~		~		~		~		~		~		~	
	Aroclor 1260	11096-82-5	~		~		~		~		~		~		~		~		~	
	Total PCBs	1336-36-3	100		1000		ND		ND		ND									
	alpha-BHC	319-84-6	20		480		1.05		0.88		0.82		0.9		1.71		0.74		0.96	
	gamma-BHC (Lindane)	58-89-9	100		1300		1.33		1.1		1.03		1.14		2.15		0.94		1.2	
	beta-BHC	319-85-7	36		360		0.86		0.72		0.67		0.74		1.4		0.61		0.78	
	delta-BHC	319-86-8	40		100000		1.81		1.5		1.4		1.55		2.93		1.27		1.64	
	Heptachlor	76-44-8	42		2100		1.49		1.23		1.15		1.27		2.41		1.05		1.35	
	Aldrin	309-00-2	5		97		1.68		1.39		1.3		1.44		2.72		1.18		1.52	
	Heptachlor epoxide	1024-57-3	20		77		1.58		1.39		1.23		1.36		2.56		1.12		1.43	
	gamma-Chlordane	5103-74-2	540		540		1.69		1.39		1.31		1.45		2.56		1.12		1.43	
	alpha-Chlordane	5103-71-9	94		4200		1.42		1.43		1.1		1.22		2.31		1		1.29	
	4,4'-DDE	72-55-9	3.3		8900		1.71		1.42		1.33		1.47		2.77		1.21		1.55	
	Endosulfan I	959-98-8	2400		24000		1.63		1.35		1.26		1.4		2.64		1.15		1.48	
	Dieldrin	60-57-1	5		200		1.82		1.51		1.41		1.56		2.95		1.29		1.65	
	Endrin	72-20-8	14		11000		1.65		1.37		1.28		1.41		2.67		1.16		1.49	
	4,4'-DDD	72-54-8	3.3		13000		54.9		0.6		0.56		0.62		1.17		0.51		0.65	
	Endosulfan II	33213-65-9	2400		24000		1.29		1.07		1		1.11		2.1		0.91		1.17	
	4,4'-DDT	50-29-3	3.3		7900		0.86		0.72		0.67		0.74		1.4		0.61		0.78	
	Endosulfan sulfate	1031-07-8	2400		24000		1.15		0.95		0.89		0.99		1.87		0.81		1.04	
	Endrin Aldehyde	7421-93-4	~		~		1.2		0.99		0.93		1.03		1.94		0.85		1.09	
	Methoxychlor	72-43-5	1200		100000		1.41		1.17		1.09		1.21		2.28		0.99		1.27	
	Endrin ketone	53494-70-5	~		~		1.52		1.26		1.18		1.3		2.46		1.07		1.37	
	Toxaphene	8001-35-2	~		~		58.3		48.4		45.2		50		94.6		41.1		52.8	
	Chlordane	57-74-9	~		~		11.1		9.23		8.62		9.53		18		7.85		10.1	
	2,4-D	94-75-7	500		100000		160		133		124		137		259		113		145	
	2,4,5-T	93-76-5	1900		100000		160		133		124		137		259		113		145	
	Silvex(2,4,5-TP)	93-72-1	3800		100000		160		133		124		137		259		113		145	
	<b>Metals, Target Analyte List</b>																			
	Aluminum	7429-90-5	~		~		3420		8210		4500		3620		6690		4780		5090	
	Antimony	7440-36-0	~		~		0.73		0.45		0.58		0.63		1.15		0.31		0.7	
	Arsenic	7440-38-2	13		16		10.8		1.5		0.26		17.6		3.08		0.13		5.79	
	Barium	7440-39-3	350		400		268		38.1		35.2		220		102		41.5		166	
	Beryllium	7440-41-7	7.2		72		0.36		0.43		0.17		0.35		0.96		0.29		0.23	
	Cadmium	7440-43-9	2.5		4.3		0.032		0.02		0.026		0.13		0.4		0.014		0.055	
	Calcium	7440-70-2	~		~		8330		1260		7400		4870		8930		700		6470	
	Chromium	7440-47-3	30		180		28.9		13.2		12.5		8.86		13.7		11.2		9.61	
	Cobalt	7440-48-4	20		30		13.4		5.93		4.88		5.33		2.03		3.99		4.76	
	Copper	7440-50-8	50		270		225		22.3		15.3		87.7		46		13.8		36.8	
	Iron	7439-89-6	~		~		115000		16900		12400		10500		9210		25100		10900	
	Lead	7439-92-1	63		400		414		15.7		3.66		1440		30.5		3.94		332	
	Magnesium	7439-95-4	~		~		961		3400		5390		486		771		2240		784	
	Manganese	7439-96-5	1600		2000		233		88.7		151		128		60.3		149		152	
	Nickel	7440-02-0	30		310		27.7		15		9.1		8.43		8.76		7.33		5.53	
	Potassium	7440-09-7	~		~		674		984		1580		535		521		249		678	
	Selenium	7782-49-2	3.9		180		0.52		0.32		0.41		0.45		0.82		0.22		0.5	
	Silver	7440-22-4	2		180		0.053		0.033		0.042		0.047		0.085		0.023		0.034	
	Sodium	7440-23-5	~		~		285		95.9		198		243		329		79.7		317	
	Thallium	7440-28-0	~		~		0.41		0.25		0.32		0.35		0.64		0.17		0.39	
	Vanadium	7440-62-2	~		~		42.8		17.3		20.4		21.6		24.5		14.3		19.5	
	Zinc	7440-66-6	109		10000		951		36.7		23.7		174		34.3		14.4		135	
	Mercury by 7470/7471		mg/kg dry		mg/kg dry		mg/kg dry		mg/kg dry		mg/kg dry		mg/kg dry		mg/kg dry		mg/kg dry		mg/kg dry	
	Mercury	7439-97-6	0.18		0.81		3.77		0.3		0.012		0.13		0.17		0.0066		0.13	
	Total Solids		%		%		%		%		%		%		%		%		%	
	% Solids		~		~		62.6		75.4		80.7		73		38.6		88.7		69.1	
	<b>GC Fingerprint - EPA 310.14</b>																			
	Gasoline		~		~		16000		NT		NT		13700		NT		NT		14500	
	Lubricating Oils		~		~		16000		NT		NT		13700		NT		NT		14500	
	Kerosene/Jet Fuel		~		~		16000		NT		NT		13700		NT		NT		14500	
	#2 Fuel Oil/Diesel		~		~		16000		NT		NT		13700		NT		NT		14500	
	#4 Fuel Oil		~		~		16000		NT		NT		13700		NT		NT		14500	
	#6 Fuel Oil		~		~		16000		NT		NT		13700		NT		NT		14500	
	Dielectric Fluid		~		~		16000		NT		NT		13700		NT		NT		14500	
	Mineral Spirit		~		~		1080000		NT		NT		5430000		NT		NT		1300000	

NOTES:  
**BOLD**=Compound detected above the method detection limit  
**Highlighted** = Regulatory Exceedances above Unrestricted Use (Track 1) SCOs  
Italicized and underline = Regulatory Exceedance above Restricted Residential (Track 2) SCO:  
 ND=Not Detected  
 NT=this indicates the analyte was not a target for this sample  
 Q is the Qualifier Column with definitions as follows:  
 U=analyte not detected at or above the level indicated  
 B=analyte found in the analysis batch blank  
 J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimate  
 D=result is from an analysis that required a dilution  
 E=result is estimated and cannot be accurately reported due to levels encountered or interference:  
 ~-this indicates that no regulatory limit has been established for this analyte

Table 3  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix	Compound CASNumber	NYSDEC Part 375 Unrestricted Use SCOs Soil	NYSDEC Part 375 Restricted Residential Use SCOs Soil	SB-06A 11-13' 1304263-2 04/23/2013 Soil		SB-06B 24-25' 1304263-3 04/23/2013 Soil		SB-06C 30-32' 1304263-4 04/23/2013 Soil		SB-07A 10-13' 1304262-1 04/22/2013 Soil		SB-12A 12-16' 1304263-7 04/23/2013 Soil		SB-12B 24-26' 1304263-8 04/23/2013 Soil		SB-12C 26-28' 1304263-9 04/23/2013 Soil	
				Result	Q												
<b>Volatile Organics, TCL (Target Compound List)</b>				ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry	
Acetone	67-64-1	50	100000	53.9	U	160		8.37	U	46.2		53	U	102	U	8.44	U
Carbon Tetrachloride	56-23-5	760	2400	14.5	U	2.41	U	2.24	U	12.4		14.2	U	27.3	U	2.26	U
Chloroform	67-66-3	370	49000	16.1	U	2.69	U	2.5	U	13.8		15.9	U	30.5	U	2.53	U
Benzene	71-43-2	60	4800	14.9	U	2.49	U	2.32	U	12.8		14.7	U	28.2	U	2.34	U
1,1,1-Trichloroethane	71-55-6	680	100000	14.5	U	2.42	U	2.26	U	12.5		14.3	U	27.5	U	2.28	U
Bromomethane	74-83-9	~	~	16.1	U	2.67	U	2.49	U	13.8		15.8	U	30.4	U	2.51	U
Chloromethane	74-87-3	~	~	11.9	U	1.98	U	1.85	U	10.2		11.7	U	22.5	U	1.86	U
Dibromomethane	74-95-3	~	~	12.8	U	2.13	U	1.98	U	11		12.6	U	24.2	U	2	U
Bromochloromethane	74-97-5	~	~	15.8	U	2.63	U	2.46	U	13.6		15.5	U	29.9	U	2.47	U
Chloroethane	75-00-3	~	~	16	U	2.66	U	2.48	U	13.7		15.7	U	30.2	U	2.5	U
Vinyl Chloride	75-01-4	20	900	17.6	U	2.93	U	2.73	U	15.1		17.3	U	33.2	U	2.75	U
Methylene Chloride	75-09-2	50	100000	15	U	2.5	U	2.33	U	12.9		14.8	U	28.4	U	2.35	U
Carbon disulfide	75-15-10	2700	100000	10.5	U	1.74	U	1.62	U	8.97		10.3	U	19.8	U	1.64	U
Bromoform	75-25-2	~	~	7.27	U	1.21	U	1.13	U	6.23		7.14	U	13.7	U	1.14	U
Bromodichloromethane	75-27-4	~	~	9.91	U	1.65	U	1.54	U	8.49		9.73	U	18.7	U	1.55	U
1,1-Dichloroethane	75-34-3	270	26000	12.8	U	2.13	U	1.98	U	11		12.6	U	24.2	U	2	U
1,1-Dichloroethene	75-35-4	330	100000	15.1	U	2.51	U	2.34	U	12.9		14.8	U	28.5	U	2.36	U
Tertiary butyl alcohol	75-65-0	~	~	121	U	20.1	U	18.7	U	103		119	U	228	U	18.9	U
Trichlorofluoromethane	75-69-4	~	~	15.3	U	2.54	U	2.37	U	13.1		15	U	28.8	U	2.39	U
Dichlorodifluoromethane	75-71-8	~	~	8.31	U	1.38	U	1.29	U	7.12		8.16	U	15.7	U	1.3	U
1,1,2-Trichlorotrifluoroethane (113 Freon)	76-13-1	6000	100000	13.7	U	2.29	U	2.13	U	11.8		13.5	U	26	U	2.15	U
1,2-Dichloropropane	78-87-5	~	~	16.1	U	2.69	U	2.5	U	13.8		15.9	U	30.5	U	2.53	U
2-Butanone	78-93-3	300	100000	29	U	4.83	U	4.5	U	24.9		28.5	U	54.8	U	4.54	U
1,1,2-Trichloroethane	79-00-5	~	~	15.3	U	2.54	U	2.37	U	13.1		15	U	28.8	U	2.39	U
Trichloroethene	79-01-6	470	21000	13.9	U	2.31	U	2.16	U	11.9		13.7	U	26.3	U	2.17	U
1,1,2,2-Tetrachloroethane	79-34-5	600	35000	15.9	U	2.65	U	2.47	U	13.6		15.6	U	30	U	2.49	U
1,2,3-Trichlorobenzene	87-61-6	20000	~	14.1	U	2.34	U	2.18	U	12.1		13.8	U	26.6	U	2.2	U
Hexachlorobutadiene	87-68-3	~	~	14.4	U	2.39	U	2.23	U	12.3		14.1	U	27.2	U	2.25	U
Naphthalene	91-20-3	12000	100000	11.1	U	1.85	U	1.72	U	9.52		435		409		5.48	J
o-xylene	95-47-6	~	~	17.5	U	2.91	U	2.72	U	15		108		142		2.74	U
2-Chlorotoluene	95-49-8	~	~	18.5	U	3.07	U	2.86	U	15.8		18.1	U	34.9	U	2.89	U
1,2-Dichlorobenzene	95-50-1	1100	100000	16.6	U	2.77	U	2.58	U	14.2		16.3	U	31.4	U	2.6	U
1,2,4-Trimethylbenzene	95-63-6	3600	52000	17.4	U	2.9	U	2.7	U	14.9		364		473		2.72	U
1,2,4,5-Tetramethylbenzene	95-93-2	~	~	1320	E	28.5		1.96	U	956		1820	E	763		10.7	U
1,2-Dibromo-3-chloropropane	96-12-8	~	~	8.07	U	1.34	U	1.25	U	6.92		7.93	U	15.3	U	1.26	U
1,2,3-Trichloropropane	96-18-4	340	80000	14.4	U	2.39	U	2.23	U	12.3		14.1	U	27.2	U	2.25	U
tert-Butylbenzene	98-82-8	5,900	100000	2980	E	16.1		2.58	U	1540		246		113		2.6	U
Isopropylbenzene	98-82-8	2,300	100,000	994		11		2.63	U	14.5		384		230		2.65	U
p-Isopropyltoluene	99-87-6	10000	~	17.2	U	2.86	U	2.67	U	14.7		86.3		130		2.69	U
Ethylbenzene	100-41-4	1000	41000	14.1	U	2.35	U	2.19	U	12.1		281		240		2.21	U
Styrene	100-42-5	300000	~	14.5	U	2.41	U	2.24	U	12.4		14.2	U	27.3	U	2.26	U
n-Propylbenzene	103-65-1	3900	100000	15.6	U	2.59	U	2.42	U	13.4		684		389		2.44	U
n-Butylbenzene	104-51-8	12000	100000	2630	E	22.3		2.67	U	1280		803		381		2.69	U
p-Diethylbenzene	105-05-5	~	~	8770	E	2.63		2.46	U	4890		370		234		2.47	U
4-Chlorotoluene	106-43-4	~	~	16.5	U	2.75	U	2.57	U	14.2		16.2	U	31.3	U	2.59	U
1,4-Dichlorobenzene	106-46-7	1800	13000	16.9	U	2.82	U	2.63	U	14.5		16.6	U	32	U	2.65	U
1,2-Dibromoethane	106-93-4	~	~	14.9	U	2.49	U	2.32	U	12.8		14.7	U	28.2	U	2.34	U
1,2-Dichloroethane	107-06-2	20	3100	16.1	U	2.67	U	2.49	U	13.8		15.8	U	30.4	U	2.51	U
Acrylonitrile	107-13-1	~	~	31.1	U	5.17	U	4.82	U	26.6		30.5	U	58.7	U	4.86	U
4-Methyl-2-pentanone	108-10-1	1000	~	38.8	U	6.46	U	6.03	U	33.3		38.2	U	73.4	U	6.07	U
m,p-xylene	1330-20-7P/M	~	~	33.4	U	5.56	U	5.18	U	28.6		90.1		106		5.22	U
1,3,5-Trimethylbenzene	108-67-8	8400	52000	17.3	U	2.87	U	2.68	U	14.8		125		135		2.7	U
Bromobenzene	108-86-1	~	~	17.3	U	2.89	U	2.69	U	14.9		17	U	32.8	U	2.71	U
Toluene	108-88-3	700	100000	195		47.8		2.36	U	309		14.9		35.7		4.6	J
Chlorobenzene	108-90-7	1100	100000	17.1	U	2.85	U	2.65	U	14.7		16.8	U	32.3	U	2.67	U
2-Chloroethylvinylether	110-75-8	~	~	23	U	3.83	U	3.57	U	19.7		22.6	U	43.5	U	3.6	U
1,2,4-Trichlorobenzene	120-82-1	20000	~	14.9	U	2.47	U	2.31	U	12.7		14.6	U	28.1	U	2.33	U
Dibromochloromethane	124-48-1	~	~	9.51	U	1.58	U	1.48	U	8.15		9.34	U	18	U	1.49	U
Tetrachloroethene	127-18-4	1300	19000	17.1	U	2.85	U	2.65	U	14.7		16.8	U	32.3	U	2.67	U
sec-Butylbenzene	135-98-8	11000	100000	17.4	U	2.87	U	2.7	U	14.9		1320	E	451		2.72	U
1,3-Dichloropropane	142-28-9	300	~	17.5	U	2.91	U	2.72	U	15		17.2	U	33.1	U	2.74	U
c-1,2-Dichloroethane	156-59-2	250	100000	14.8	U	2.46	U	2.29	U	12.7		14.5	U	27.9	U	2.31	U
t-1,2-Dichloroethane	156-60-5	190	100000	14.5	U	2.42	U	2.26	U	12.5		14.3	U	27.5	U	2.28	U
1,3-Dichlorobenzene	541-73-1	2400	49000	16.2	U	2.7	U	2.52	U	13.9		15.9	U	30.7	U	2.54	U
1,1-Dichloropropene	563-58-6	~	~	14	U	2.33	U	2.17	U	12		13.7	U	26.4	U	2.19	U
2,2-Dichloropropane	590-20-7	~	~	13.8	U	2.3	U	2.15	U	11.9		13.6	U	26.1	U	2.16	U
2-Hexanone	591-78-6	~	~	25.6	U	4.27	U	3.98	U	22		25.2	U	48.5	U	4.01	U
p-Ethyltoluene	622-96-8	~	~	17.1	U	2.85	U	2.65	U	14.7		149		144		2.67	U
1,1,1,2-Tetrachloroethane	630-20-6	~	~	14.9	U	2.47	U	2.31	U	12.7		14.6	U	28.1	U	2.33	U
TAME	994-05-08	~	~	14.1	U	2.34	U	2.18	U	12.1		13.8	U	26.6	U	2.2	U
Methyl t-butyl ether	1634-04-4	930															

Table 3  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix	Compound	CASNumber	NYSDEC Part 375 Unrestricted Use SOs Soil	NYSDEC Part 375 Restricted Residential Use SOs Soil	SB-06A 11-13' 1304263-2 04/23/2013 Soil		SB-06B 24-25' 1304263-3 04/23/2013 Soil		SB-06C 30-32' 1304263-4 04/23/2013 Soil		SB-07A 10-13' 1304262-1 04/22/2013 Soil		SB-12A 12-16' 1304263-7 04/23/2013 Soil		SB-12B 24-26' 1304263-8 04/23/2013 Soil		SB-12C 26-28' 1304263-9 04/23/2013 Soil	
					Result	Q												
	<b>Semi-Volatiles, EPA TCL List</b>		ug/kg dry	ug/kg dry														
	1,2,4-Trichlorobenzene	120-82-1	~	~	63.1	U	52.4	U	48.9	U	54.1	U	62	U	119	U	49.4	U
	1,2-Dichlorobenzene	95-50-1	1100	100000	51.1	U	42.4	U	39.7	U	43.8	U	50.2	U	96.4	U	40	U
	1,2-Diphenylhydrazine	122-66-7	~	~	57.8	U	48	U	44.9	U	49.6	U	56.8	U	109	U	45.3	U
	1,3-Dichlorobenzene	541-73-1	2400	49000	51.6	U	42.8	U	40	U	44.2	U	50.7	U	97.3	U	40.4	U
	1,4-Dichlorobenzene	106-46-7	1800	13000	45.8	U	38.1	U	35.6	U	39.3	U	45.1	U	86.4	U	35.9	U
	2,3,4,6-Tetrachlorophenol	58-90-2	~	~	58	U	48.1	U	45	U	49.7	U	57	U	109	U	45.4	U
	2,4,5-Trichlorophenol	95-95-4	100	100000	24.1	U	20	U	18.7	U	20.7	U	23.7	U	45.5	U	18.9	U
	2,4,6-Trichlorophenol	88-06-2	10000	~	47.8	U	39.7	U	37.1	U	41	U	46.9	U	90.1	U	37.4	U
	2,4-Dichlorophenol	120-83-2	~	~	48.2	U	40.1	U	37.4	U	41.4	U	47.4	U	91	U	37.8	U
	2,4-Dimethylphenol	105-67-9	~	~	51.8	U	43	U	40.1	U	44.4	U	50.9	U	97.6	U	40.5	U
	2,4-Dinitrophenol	51-28-5	~	~	1600	U	1330	U	1240	U	1370	U	1570	U	3010	U	1250	U
	2,4-Dinitrotoluene	121-14-2	~	~	52.1	U	43.2	U	40.4	U	44.7	U	51.2	U	98.2	U	40.8	U
	2,6-Dinitrotoluene	606-20-2	~	~	46.6	U	38.7	U	36.2	U	40	U	45.8	U	88	U	36.5	U
	2-Chloronaphthalene	91-58-7	~	~	47.3	U	39.3	U	36.7	U	40.5	U	46.5	U	89.2	U	37	U
	2-Chlorophenol	95-57-8	800	100000	60.7	U	50.4	U	47.1	U	52.1	U	59.7	U	114	U	47.5	U
	2-Methylnaphthalene	91-57-6	410	~	49.8	U	41.4	U	38.7	U	42.7	U	49	U	94	U	39	U
	2-Methylphenol (o cresol)	95-48-7	330	100000	46.2	U	38.3	U	35.8	U	39.6	U	45.4	U	87	U	36.1	U
	2-Nitroaniline	88-74-4	~	~	20.9	U	17.4	U	16.2	U	17.9	U	20.6	U	39.5	U	16.4	U
	2-Nitrophenol	88-75-5	300	~	21.1	U	17.5	U	16.4	U	18.1	U	20.7	U	39.8	U	16.5	U
	3,4-Methylphenol	100-01-6	~	~	52.6	U	43.6	U	40.8	U	45.1	U	51.6	J	99.1	U	41.1	U
	3,3'-Dichlorobenzidine	91-94-1	~	~	101	U	84.1	U	78.6	U	86.8	U	99.5	U	191	U	79.3	U
	3-Nitroaniline	99-09-2	~	~	77.6	U	64.5	U	60.2	U	66.6	U	76.3	U	146	U	60.8	U
	4,6-Dinitro-2-methylphenol	534-52-1	~	~	127	U	106	U	98.6	U	109	U	125	U	240	U	99.5	U
	4-Bromophenyl phenyl ether	101-55-3	~	~	45.8	U	38.1	U	35.6	U	39.3	U	45.1	U	86.4	U	35.9	U
	4-Chloro-3-methylphenol	59-50-7	~	~	46	U	38.2	U	35.7	U	39.5	U	45.2	U	86.7	U	36	U
	4-Chloroaniline	106-47-8	220	100000	69	U	57.3	U	53.5	U	59.2	U	67.8	U	130	U	54	U
	4-Chlorophenyl phenyl ether	7005-72-3	~	~	34	U	28.2	U	26.4	U	29.2	U	33.4	U	64.2	U	26.6	U
	4-Nitroaniline	100-02-7	~	~	61.2	U	50.8	U	47.5	U	52.5	U	60.1	U	115	U	47.9	U
	4-Nitrophenol	56-57-5	100	~	60.7	U	50.4	U	47.1	U	52.1	U	59.7	U	114	U	47.5	U
	Acenaphthene	83-32-9	20000	100000	41.1	U	34.1	U	31.8	U	35.2	U	40.3	U	77.4	U	32.1	U
	Acenaphthylene	208-96-8	100000	100000	46.6	U	38.7	U	36.2	U	40	U	45.8	U	88	U	36.5	U
	Aniline	62-53-3	330	100000	51.4	U	42.7	U	39.9	U	44.1	U	50.5	U	97	U	40.3	U
	Anthracene	120-12-7	100000	100000	56.9	U	47.2	U	44.1	U	48.8	U	55.9	U	107	U	44.5	U
	Benidine	92-87-5	~	~	1350	U	1120	U	1050	U	1160	U	1330	U	2550	U	1060	U
	Benzo(a)anthracene	56-55-3	1000	1000	75.7	U	62.9	U	58.7	U	64.9	U	74.4	U	143	U	59.3	U
	Benzo(a)pyrene	50-32-8	1000	1000	193	J	59.9	U	56	U	61.9	J	136	U	136	U	56.5	U
	Benzo(b)fluoranthene	205-99-2	1000	1000	188	J	58	U	54.2	U	59.9	J	132	U	132	U	54.6	U
	Benzo(g,h,i)perylene	191-24-2	100000	100000	118	J	42.6	U	39.8	U	44	J	64.4	J	96.7	U	40.1	U
	Benzo(k)fluoranthene	207-08-9	800	3900	108	U	89.4	U	83.5	U	92.3	U	106	U	203	U	84.3	U
	Benzoic acid	65-85-0	2700	100000	18400	U	15300	U	14300	U	15800	U	18100	U	34600	U	14400	U
	Benzyl alcohol	100-51-6	~	~	43.1	U	35.8	U	33.5	U	37	U	42.4	U	81.3	U	33.8	U
	Butyl benzyl phthalate	85-68-7	122000	100000	82.1	U	68.2	U	63.7	U	70.4	U	80.7	U	155	U	64.3	U
	Carbazole	86-74-8	~	~	92	U	76.4	U	71.4	U	78.9	U	90.4	U	173	U	72	U
	Chrysene	218-01-9	1000	3900	71.2	U	59.2	U	55.3	U	61.1	U	70	U	134	U	55.8	U
	Cresols	~	330	100000	98.8	U	81.9	U	76.6	U	84.7	U	51.6	U	186	U	77.2	U
	Di-n-butyl phthalate	84-74-2	~	~	70.4	U	58.5	U	54.6	U	60.4	U	69.2	U	133	U	55.1	U
	Di-n-octyl phthalate	117-84-0	~	~	62.8	U	92.8	U	94.2	U	53.8	U	61.7	U	205	U	184	U
	Dibenz(a,h)anthracene	53-70-3	330	330	58.8	U	48.8	U	45.6	U	50.4	U	57.8	U	111	U	46	U
	Dibenzofuran	132-64-9	~	~	40.9	U	34	U	31.7	U	35.1	U	40.2	U	77.1	U	32	U
	Diethyl phthalate	84-66-2	7100	100000	67.7	U	56.2	U	52.5	U	58.1	U	66.6	U	128	U	53	U
	Dimethyl phthalate	131-11-3	~	~	54.6	U	45.4	U	42.4	U	46.8	U	53.7	U	103	U	42.8	U
	Fluoranthene	206-44-0	100000	100000	419	U	59.9	U	56	U	89	J	341	J	136	U	56.5	U
	Fluorene	86-73-7	30000	100000	47	U	39	U	36.4	U	40.3	U	46.2	U	88.6	U	36.8	U
	Hexachlorobenzene	118-74-1	330	410	56.2	U	46.7	U	43.6	U	48.2	U	55.3	U	106	U	44	U
	Hexachlorobutadiene	87-68-3	~	~	55.3	U	45.9	U	42.9	U	47.4	U	54.3	U	104	U	43.3	U
	Hexachlorocyclopentadiene	77-47-4	~	~	16.8	U	13.9	U	13	U	14.4	U	16.5	U	31.6	U	13.1	U
	Hexachloroethane	67-72-1	~	~	57.3	U	47.6	U	44.5	U	49.2	U	56.4	U	108	U	44.9	U
	Indeno(1,2,3-cd)pyrene	193-39-5	500	500	92.7	U	46.9	U	43.9	U	48.5	U	55.6	U	107	U	44.3	U
	Isophorone	78-59-1	4400	100000	46.2	U	38.3	U	35.8	U	39.6	U	45.4	U	87	U	36.1	U
	N-Nitrosodi-n-propylamine	621-64-7	~	~	63.9	U	53.1	U	49.6	U	54.8	U	62.8	U	120	U	50	U
	N-Nitrosodimethylamine	62-75-9	~	~	115	U	95.2	U	89	U	98.4	U	113	U	216	U	89.8	U
	N-Nitrosodiphenylamine	86-30-6	~	~	69.5	U	57.7	U	53.9	U	59.6	U	68.3	U	131	U	54.4	U
	Naphthalene	91-20-3	12000	100000	1560	U	56.2	U	52.5	U	58.1	U	66.6	U	128	U	53	U
	Nitrobenzene	98-95-3	3700	15000	43.3	U	35.9	U	33.6	U	37.1	U	42.5	U	81.6	U	33.9	U
	Pentachlorophenol	87-86-5	800	6700	438	U	363	U	340	U	375	U	430	U	825	U	342	U
	Phenanthrene	85-01-8	100000	100000	66.6	U	55.3	U	51.7	U	57.1	U	65.5	U	126	U	52.1	U
	Phenol	108-95-2	330	100000	58.6	U	48.7	U	45.5	U	50.3	U	57.6	U	111	U	45.9	U
	Pyrene	129-00-0	10000															

Table 3  
Soil Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix	Compound CASNumber	NYSDEC Part 375 Unrestricted Use SCOs Soil	NYSDEC Part 375 Restricted Residential Use SCOs Soil	SB-06A 11-13' 1304263-2 04/23/2013 Soil		SB-06B 24-25' 1304263-3 04/23/2013 Soil		SB-06C 30-32' 1304263-4 04/23/2013 Soil		SB-07A 10-13' 1304262-1 04/22/2013 Soil		SB-12A 12-16' 1304263-7 04/23/2013 Soil		SB-12B 24-26' 1304263-8 04/23/2013 Soil		SB-12C 26-28' 1304263-9 04/23/2013 Soil	
				Result	Q												
<b>PCBs, Pesticides, Herbicides EPA 8082/8081/8321 List</b>																	
Aroclor 1016	12674-11-2	~	~	25.4	U	21.1	U	19.7	U	21.8	U	25	U	47.9	U	19.9	U
Aroclor 1221	11104-28-2	~	~	25.4	U	21.1	U	19.7	U	21.8	U	25	U	47.9	U	19.9	U
Aroclor 1232	11141-16-5	~	~	25.4	U	21.1	U	19.7	U	21.8	U	25	U	47.9	U	19.9	U
Aroclor 1242	53469-21-9	~	~	25.4	U	21.1	U	19.7	U	21.8	U	25	U	47.9	U	19.9	U
Aroclor 1248	12672-29-6	~	~	25.4	U	21.1	U	19.7	U	21.8	U	25	U	47.9	U	19.9	U
Aroclor 1254	11097-69-1	~	~	25.4	U	21.1	U	19.7	U	21.8	U	25	U	47.9	U	19.9	U
Aroclor 1260	11096-82-5	~	~	17.7	U	14.7	U	13.8	U	15.2	U	17.4	U	33.4	U	13.9	U
Total PCBs	1336-36-3	100	1000	ND													
alpha-BHC	319-84-6	20	480	1.05	U	0.88	U	0.82	U	0.9	U	1.04	U	1.99	U	0.82	U
gamma-BHC (Lindane)	58-89-9	100	1300	1.33	U	1.1	U	1.03	U	1.14	U	1.3	U	2.5	U	1.04	U
beta-BHC	319-85-7	36	360	0.86	U	0.72	U	0.67	U	0.74	U	0.85	U	1.63	U	0.68	U
delta-BHC	319-86-8	40	100000	1.81	U	1.5	U	1.4	U	1.55	U	1.77	U	3.4	U	1.41	U
Heptachlor	76-44-8	42	2100	1.49	U	1.23	U	1.15	U	1.27	U	1.46	U	2.8	U	1.16	U
Aldrin	309-00-2	5	97	1.68	U	1.39	U	1.3	U	1.44	U	1.65	U	3.16	U	1.31	U
Heptachlor epoxide	1024-57-3	20	77	1.58	U	3.63	J	1.23	U	1.36	U	1.55	U	2.98	U	1.24	U
gamma-Chlordane	5103-74-2	540	540	1.69	U	6.39	J	1.31	U	1.45	U	1.66	U	3.19	U	1.33	U
alpha-Chlordane	5103-71-9	94	4200	1.42	U	14.3	J	1.1	U	1.22	U	1.4	U	2.68	U	1.11	U
4,4'-DDE	72-55-9	3.3	8900	1.71	U	1.42	U	1.33	U	1.47	U	1.68	U	3.22	U	1.34	U
Endosulfan I	959-98-8	2400	24000	1.63	U	1.35	U	1.26	U	1.4	U	1.6	U	3.07	U	1.27	U
Dieldrin	60-57-1	5	200	1.82	U	1.51	U	1.41	U	1.56	U	1.79	U	3.43	U	1.42	U
Endrin	72-20-8	14	11000	1.65	U	1.37	U	1.28	U	1.41	U	1.62	U	3.1	U	1.29	U
4,4'-DDD	72-54-8	3.3	13000	54.9		0.6	U	0.56	U	0.62	U	0.71	U	1.36	U	0.56	U
Endosulfan II	33213-65-9	2400	24000	1.29	U	1.07	U	1	U	1.11	U	1.27	U	2.44	U	1.01	U
4,4'-DDT	50-29-3	3.3	7900	0.86	U	0.72	U	0.67	U	0.74	U	0.85	U	1.63	U	0.68	U
Endosulfan sulfate	1031-07-8	2400	24000	1.15	U	0.95	U	0.89	U	0.99	U	1.13	U	2.17	U	0.9	U
Endrin Aldehyde	7421-93-4	~	~	1.2	U	0.99	U	0.93	U	1.03	U	1.18	U	2.26	U	0.94	U
Methoxychlor	72-43-5	1200	100000	1.41	U	1.17	U	1.09	U	1.21	U	1.38	U	2.65	U	1.1	U
Endrin ketone	53494-70-5	~	~	1.52	U	1.26	U	1.18	U	1.3	U	1.49	U	2.86	U	1.19	U
Toxaphene	8001-35-2	~	~	58.3	U	48.4	U	45.2	U	50	U	57.3	U	110	U	45.6	U
Chlordane	57-74-9	~	~	11.1	U	9.23	U	8.62	U	9.53	U	10.9	U	21	U	8.7	U
2,4-D	94-75-7	500	100000	160	U	133	U	124	U	137	U	157	U	301	U	125	U
2,4,5-T	93-76-5	1900	100000	160	U	133	U	124	U	137	U	157	U	301	U	125	U
Silvex(2,4,5-TP)	93-72-1	3800	100000	160	U	133	U	124	U	137	U	157	U	301	U	125	U
<b>Metals, Target Analyte List</b>																	
Aluminum	7429-90-5	~	~	3420		8210		4500		3620		3900		12000		3850	
Antimony	7440-36-0	~	~	0.73	U	0.45	U	0.58	U	0.63	U	0.68	U	6.55	U	0.46	U
Arsenic	7440-38-2	13	16	10.8		1.5		0.26		17.6		23.5		4.24		0.19	
Barium	7440-39-3	350	400	268		38.1		35.2		220		152		58.3		34.9	
Beryllium	7440-41-7	7.2	72	0.36		0.43		0.17		0.35		0.31		0.88		0.16	
Cadmium	7440-43-9	2.5	4.3	0.032		0.02	U	0.026	U	0.13		0.11	U	0.29	U	0.02	U
Calcium	7440-70-2	~	~	8330		1260		7400		4870		20200		7890		3500	
Chromium	7440-47-3	30	180	28.9		13.2		12.5		8.86		13		21.4		18.4	
Cobalt	7440-48-4	20	30	13.4		5.93		4.88		5.33		3.83		9.14		5.76	
Copper	7440-50-8	50	270	225		22.3		15.3		87.7		66.4		27.4		14.1	
Iron	7439-89-6	~	~	115000		16900		12400		10500		6930		31100		11400	
Lead	7439-92-1	63	400	414		15.7		3.66		1440		625		61.6		3.76	
Magnesium	7439-95-4	~	~	961		3400		5390		486		700		5270		3400	
Manganese	7439-96-5	1600	2000	233		88.7		151		128		107		292		72.5	
Nickel	7440-02-0	30	310	27.7		15		9.1		8.43		7.74		22.9		9.98	
Potassium	7440-09-7	~	~	674		984		1580		535		633		2170		1480	
Selenium	7782-49-2	3.9	180	0.52	U	0.32	U	0.41	U	0.45	U	0.49	U	4.69	U	0.33	U
Silver	7440-22-4	2	180	0.053	U	0.033	U	0.042	U	0.047	U	0.05	U	0.48	U	0.034	U
Sodium	7440-23-5	~	~	285		95.9		198		243		518		269		97	
Thallium	7440-28-0	~	~	0.41	U	0.25	U	0.32	U	0.35	U	0.38	U	3.66	U	0.26	U
Vanadium	7440-62-2	~	~	42.8		17.3		20.4		21.6		17.2		54.2		23.9	
Zinc	7440-66-6	109	10000	951		36.7		23.7		174		154		61.8		25.9	
Mercury by 7470/7471		mg/kg dry	mg/kg dry	mg/kg dry													
Mercury	7439-97-6	0.18	0.81	3.77		0.3		0.012		0.13		2.09		0.18		0.0076	
Total Solids		%	%	%		%		%		%		%		%		%	
% Solids		~	~	62.6		75.4		80.7		73		63.7		33.2		80	
<b>GC Fingerprint - EPA 310.14</b>																	
Gasoline		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
Lubricating Oils		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
Kerosene/Jet Fuel		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
#2 Fuel Oil/Diesel		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
#4 Fuel Oil		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
#6 Fuel Oil		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
Dielectric Fluid		~	~	16000	U	NT		NT		13700		15700	U	NT		NT	
Mineral Spirit		~	~	1080000		NT		NT		5430000		67800		NT		NT	
NOTES:																	
BOLD=Compound detected above the method detection limit																	
Highlighted = Regulatory Exceedences above Unrestricted Use (Track 1) SCOs																	
Italicized and underline = Regulatory Exceedence above Restricted Residential (Track 2) SCO:																	
ND=Not Detected																	
NT=this indicates the analyte was not a target for this sample																	
Q is the Qualifier Column with definitions as follows:																	
U=analyte not detected at or above the level indicated																	
B=analyte found in the analysis batch blank																	
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimate																	
D=result is from an analysis that required a dilution																	
E=result is estimated and cannot be accurately reported due to levels encountered or interference:																	
~=this indicates that no regulatory limit has been established for this analyte																	

Table 4  
Groundwater Sample Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date ClientMatrix	NYSDEC TOGS Groundwater Quality Standards (GQS)		TWP-01 1304264-3 04/23/2013		TWP-02 1304264-1 04/22/2013		TWP-03 1304264-2 04/22/2013		
	Compound	CASNumber	Water	Water		Water		Water	
				Result	Q	Result	Q	Result	Q
<b>Volatile Organics, TCL (Target Compound List)</b>			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	
Acetone	67-64-1	50	1.18	U	1.18	U	1.18	U	
Carbon Tetrachloride	56-23-5	5	0.28	U	0.28	U	0.28	U	
Chloroform	67-66-3	7	0.31	U	0.31	U	0.31	U	
Benzene	71-43-2	1	0.3	U	0.3	U	0.3	U	
1,1,1-Trichloroethane	71-55-6	5	0.34	U	0.34	U	0.34	U	
Bromomethane	74-83-9	~	0.34	U	0.34	U	0.34	U	
Chloromethane	74-87-3	5	0.5	U	0.5	U	0.5	U	
Dibromomethane	74-95-3	5	0.37	U	0.37	U	0.37	U	
Bromochloromethane	74-97-5	50	0.28	U	0.28	U	0.28	U	
Chloroethane	75-00-3	5	0.86	U	0.86	U	0.86	U	
Vinyl Chloride	75-01-4	2	0.71	U	0.71	U	0.71	U	
Methylene Chloride	75-09-2	5	0.23	U	0.23	U	0.23	U	
Carbon disulfide	75-15-0	~	0.34	U	0.34	U	0.34	U	
Bromoform	75-25-2	50	0.22	U	0.22	U	0.22	U	
Bromodichloromethane	75-27-4	~	0.23	U	0.23	U	0.23	U	
1,1-Dichloroethane	75-34-3	5	0.27	U	0.27	U	0.27	U	
1,1-Dichloroethene	75-35-4	5	0.28	U	0.28	U	0.28	U	
Tertiary butyl alcohol	75-65-0	~	5.68	U	5.68	U	5.68	U	
Trichlorofluoromethane	75-69-4	5	0.38	U	0.38	U	0.38	U	
Dichlorodifluoromethane	75-71-8	5	0.37	U	0.37	U	0.37	U	
1,1,2-Trichlorotrifluoroethane	76-13-1	5	0.58	U	0.58	U	0.58	U	
1,2-Dichloropropane	78-87-5	1	0.36	U	0.36	U	0.36	U	
2-Butanone	78-93-3	50	1.37	U	1.37	U	1.37	U	
1,1,2-Trichloroethane	79-00-5	1	0.28	U	0.28	U	0.28	U	
Trichloroethene	79-01-6	5	0.18	U	0.18	U	0.18	U	
1,1,2,2-Tetrachloroethane	79-34-5	5	0.25	U	0.25	U	0.25	U	
1,2,3-Trichlorobenzene	87-61-6	5	0.38	U	0.38	U	0.38	U	
Hexachlorobutadiene	87-68-3	0.5	0.32	U	0.32	U	0.32	U	
Naphthalene	91-20-3	10	0.12	U	0.12	U	1.19	U	
o-xylene	95-47-6	5	0.32	U	0.32	U	0.32	U	
2-Chlorotoluene	95-49-8	5	0.26	U	0.26	U	0.26	U	
1,2-Dichlorobenzene	95-50-1	3	0.15	U	0.15	U	0.15	U	
1,2,4-Trimethylbenzene	95-63-6	5	0.23	U	1.85	J	7.78	J	
1,2,4,5-Tetramethylbenzene	95-93-2	5	90.9	J	135	J	49.5	J	
1,2-Dibromo-3-chloropropane	96-12-8	0.04	0.55	U	0.55	U	0.55	U	
1,2,3-Trichloropropane	96-18-4	0.04	0.21	U	0.21	U	0.21	U	
tert-Butylbenzene	98-82-8	5	43.5	J	43.7	J	19.8	J	
Isopropylbenzene	98-82-8	5	33.7	J	9.2	J	70.7	J	
4-Isopropyltoluene	99-87-6	5	4.92	J	0.29	U	5.02	J	
Ethylbenzene	100-41-4	5	0.27	U	0.27	U	0.27	U	
Styrene	100-42-5	5	0.2	U	0.2	U	0.2	U	
n-Propylbenzene	103-65-1	5	8.99	J	0.25	U	121	J	
n-Butylbenzene	104-51-8	5	63.4	J	31.4	J	42	J	
p-Diethylbenzene	105-05-5	~	0.25	U	42.7	J	0.25	U	
4-Chlorotoluene	106-43-4	5	0.26	U	0.26	U	0.26	U	
1,4-Dichlorobenzene	106-46-7	3	0.27	U	0.27	U	0.27	U	
1,2-Dibromoethane	106-93-4	5	0.23	U	0.23	U	0.23	U	
1,2-Dichloroethane	107-06-2	0.6	0.3	U	0.3	U	0.3	U	
Acrylonitrile	107-13-1	5	1.97	U	1.97	U	1.97	U	
4-Methyl-2-pentanone	108-10-1	~	3.94	U	3.94	U	3.94	U	
m,p-xylene	1330-20-7P/M	5	0.74	U	0.74	U	0.82	J	
1,3,5-Trimethylbenzene	108-67-8	5	0.2	U	0.2	U	2.97	J	
Bromobenzene	108-86-1	5	0.28	U	0.28	U	0.28	U	
Toluene	108-88-3	5	1.57	J	0.6	J	0.34	U	
Chlorobenzene	108-90-7	5	0.24	U	0.24	U	0.24	U	
2-Chloroethylvinylether	110-75-8	~	1.15	U	1.15	U	1.15	U	
1,2,4-Trichlorobenzene	120-82-1	5	0.23	U	0.23	U	0.23	U	
Dibromochloromethane	124-48-1	50	0.21	U	0.21	U	0.21	U	
Tetrachloroethene	127-18-4	5	0.46	U	0.46	U	0.46	U	
sec-Butylbenzene	135-98-8	5	160	J	92.2	J	90	J	
1,3-Dichloropropane	142-28-9	5	0.39	U	0.39	U	0.39	U	
c-1,2-Dichloroethene	156-59-2	5	0.24	U	0.24	U	0.24	U	
t-1,2-Dichloroethene	156-60-5	~	0.42	U	0.42	U	0.42	U	
1,3-Dichlorobenzene	541-73-1	20	0.26	U	0.26	U	0.26	U	
1,1-Dichloropropene	563-58-6	5	0.47	U	0.47	U	0.47	U	
2,2-Dichloropropane	590-20-7	5	0.35	U	0.35	U	0.35	U	
2-Hexanone	591-78-6	50	2.54	U	2.54	U	2.54	U	
p-Ethyltoluene	622-96-8	~	0.31	U	0.31	U	2.94	J	
1,1,1,2-Tetrachloroethane	630-20-6	5	0.22	U	0.22	U	0.22	U	
TAME	994-05-08	~	0.27	U	0.27	U	0.27	U	
Methyl t-butyl ether	1634-04-4	10	0.17	U	0.17	U	3.39	J	
c-1,3-Dichloropropene	10061-01-5	0.4	0.33	U	0.33	U	0.33	U	
t-1,3-Dichloropropene	10061-02-6	0.4	0.26	U	0.26	U	0.26	U	

Table 4  
Groundwater Sample Results  
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SampleID LabID Sampling Date ClientMatrix	Compound	CASNumber	NYSDEC TOGS Groundwater Quality Standards (GQS)  Water	TWP-01 1304264-3 04/23/2013		TWP-02 1304264-1 04/22/2013		TWP-03 1304264-2 04/22/2013	
				Water		Water		Water	
				Result	Q	Result	Q	Result	Q
	<b>Semi-Volatiles, EPA TCL List</b>		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	
	1,2,4-Trichlorobenzene	120-82-1	5	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	
	1,2-Dichlorobenzene	95-50-1	3	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	
	1,2-Diphenylhydrazine	122-66-7	0.05	1.02 U	1.02 U	1.02 U	1.02 U	1.02 U	
	1,3-Dichlorobenzene	541-73-1	3	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	
	1,4-Dichlorobenzene	106-46-7	3	0.73 U	0.73 U	0.73 U	0.73 U	0.73 U	
	2,3,4,6-Tetrachlorophenol	58-90-2	~	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	
	2,4,5-Trichlorophenol	95-95-4	1	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	
	2,4,6-Trichlorophenol	88-06-2	1	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	
	2,4-Dichlorophenol	120-83-2	5	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	
	2,4-Dimethylphenol	105-67-9	50	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	
	2,4-Dinitrophenol	51-28-5	10	1.61 U	1.61 U	1.61 U	1.61 U	1.61 U	
	2,4-Dinitrotoluene	121-14-2	5	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	
	2,6-Dinitrotoluene	606-20-2	5	0.99 U	0.99 U	0.99 U	0.99 U	0.99 U	
	2-Chloronaphthalene	91-58-7	10	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	
	2-Chlorophenol	95-57-8	1	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	
	2-Methylnaphthalene	91-57-6	~	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U	
	2-Methylphenol	95-48-7	1	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	
	2-Nitroaniline	88-74-4	5	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	
	2-Nitrophenol	88-75-5	1	0.62 U	0.62 U	0.62 U	0.62 U	0.62 U	
	3,4-Methylphenol	100-01-6	5	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	
	3,3'-Dichlorobenzidine	91-94-1	~	1.33 U	1.33 U	1.33 U	1.33 U	1.33 U	
	3-Nitroaniline	99-09-2	5	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	
	4,6-Dinitro-2-methylphenol	534-52-1	~	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	
	4-Bromophenyl phenyl ether	101-55-3	~	1.01 U	1.01 U	1.01 U	1.01 U	1.01 U	
	4-Chloro-3-methylphenol	59-50-7	1	0.73 U	0.73 U	0.73 U	0.73 U	0.73 U	
	4-Chloroaniline	106-47-8	5	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	
	4-Chlorophenyl phenyl ether	7005-72-3	~	0.86 U	0.86 U	0.86 U	0.86 U	0.86 U	
	4-Nitroaniline	100-02-7	5	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	
	4-Nitrophenol	56-57-5	1	1.61 U	1.61 U	1.61 U	1.61 U	1.61 U	
	Acenaphthene	83-32-9	20	0.77 U	0.77 U	0.77 U	0.77 U	0.77 U	
	Acenaphthylene	208-96-8	~	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U	
	Aniline	62-53-3	5	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	
	Anthracene	120-12-7	50	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	
	Benidine	92-87-5	5	48.2 U	48.2 U	48.2 U	48.2 U	48.2 U	
	Benzo(a)anthracene	56-55-3	0.002	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	
	Benzo(a)pyrene	50-32-8	0.002	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	
	Benzo(b)fluoranthene	205-99-2	0.002	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	
	Benzo(g,h,i)perylene	191-24-2	~	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	
	Benzo(k)fluoranthene	207-08-9	0.002	1 U	1 U	1 U	1 U	1 U	
	Benzoic acid	65-85-0	~	10 U	10 U	10 U	10 U	10 U	
	Benzyl alcohol	100-51-6	~	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	
	Butyl benzyl phthalate	85-68-7	50	1.06 U	1.06 U	1.06 U	1.06 U	1.06 U	
	Carbazole	86-74-8	~	1.99 U	1.99 U	1.99 U	1.99 U	1.99 U	
	Chrysene	218-01-9	0.002	1 U	1 U	1 U	1 U	1 U	
	Cresols		~	0.77 U	0.77 U	0.77 U	0.77 U	0.77 U	
	Di-n-butyl phthalate	84-74-2	50	1.08 U	1.08 U	1.08 U	1.08 U	1.08 U	
	Di-n-octyl phthalate	117-84-0	50	1.28 U	1.28 U	1.28 U	1.28 U	1.28 U	
	Dibenz(a,h)anthracene	53-70-3	~	1 U	1 U	1 U	1 U	1 U	
	Dibenzofuran	132-64-9	~	0.62 U	0.62 U	0.62 U	0.62 U	0.62 U	
	Diethyl phthalate	84-66-2	50	1 U	1 U	1 U	1 U	1 U	
	Dimethyl phthalate	131-11-3	50	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	
	Fluoranthene	206-44-0	50	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	
	Fluorene	86-73-7	50	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	
	Hexachlorobenzene	118-74-1	0.04	0.86 U	0.86 U	0.86 U	0.86 U	0.86 U	
	Hexachlorobutadiene	87-68-3	0.5	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	
	Hexachlorocyclopentadiene	77-47-4	5	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	
	Hexachloroethane	67-72-1	5	0.69 U	0.69 U	0.69 U	0.69 U	0.69 U	
	Indeno(1,2,3-cd)pyrene	193-39-5	0.002	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	
	Isophorone	78-59-1	50	0.69 U	0.69 U	0.69 U	0.69 U	0.69 U	
	N-Nitrosodi-n-propylamine	621-64-7	~	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	
	N-Nitrosodimethylamine	62-75-9	~	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	
	N-Nitrosodiphenylamine	86-30-6	50	1.09 U	1.09 U	1.09 U	1.09 U	1.09 U	
	Naphthalene	91-20-3	10	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	
	Nitrobenzene	98-95-3	0.4	0.71 U	0.71 U	0.71 U	0.71 U	0.71 U	
	Pentachlorophenol	87-86-5	1	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	
	Phenanthrene	85-01-8	50	0.95 U	0.95 U	0.95 U	0.95 U	0.95 U	
	Phenol	108-95-2	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	
	Pyrene	129-00-0	50	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	
	Pyridine	110-86-1	50	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	
	bis(2-Chloroethoxy)methane	111-91-1	5	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	
	bis(2-Chloroethyl)ether	111-44-4	1	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	
	bis(2-Chloroisopropyl)ether	108-60-1	5	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U	
	bis(2-Ethylhexyl)phthalate	117-81-7	5	1.26 U	1.26 U	1.26 U	1.26 U	1.26 U	

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SampleID LabID Sampling Date ClientMatrix	NYSDEC TOGS Groundwater Quality Standards (GQS)		TWP-01 1304264-3 04/23/2013 Water		TWP-02 1304264-1 04/22/2013 Water		TWP-03 1304264-2 04/22/2013 Water		
	Compound	CASNumber	Water	Result	Q	Result	Q	Result	Q
<b>PCBs, Pesticides, Herbicides EPA 8082/8081/8321 List</b>									
Aroclor 1016	12674-11-2	~	0.074	U	0.074	U	0.074	U	
Aroclor 1221	11104-28-2	~	0.09	U	0.09	U	0.09	U	
Aroclor 1232	11141-16-5	~	0.09	U	0.09	U	0.09	U	
Aroclor 1242	53469-21-9	~	0.09	U	0.09	U	0.09	U	
Aroclor 1248	12672-29-6	~	0.09	U	0.09	U	0.09	U	
Aroclor 1254	11097-69-1	~	0.09	U	0.09	U	0.09	U	
Aroclor 1260	11096-82-5	~	0.1	U	0.1	U	0.1	U	
Total PCBs	1336-36-3		ND		ND		ND		
alpha-BHC	319-84-6	0.01	0.00092	U	0.00092	U	0.00092	U	
gamma-BHC (Lindane)	58-89-9	0.05	0.00089	U	0.00089	U	0.00089	U	
beta-BHC	319-85-7	0.04	0.0015	U	0.0015	U	0.0015	U	
delta-BHC	319-86-8	0.04	0.0013	U	0.0013	U	0.0013	U	
Heptachlor	76-44-8	0.04	0.0012	U	0.0012	U	0.0012	U	
Aldrin	309-00-2	0.002	0.0011	U	0.0011	U	0.0011	U	
Heptachlor epoxide	1024-57-3	0.03	0.0013	U	0.0013	U	0.0013	U	
gamma-Chlordane	5103-74-2	~	0.0013	U	0.0013	U	0.0013	U	
alpha-Chlordane	5103-71-9	~	0.0012	U	0.0012	U	0.0012	U	
4,4'-DDE	72-55-9	0.2	0.0015	U	0.0015	U	0.0015	U	
Endosulfan I	959-98-8	~	0.0013	U	0.0013	U	0.0013	U	
Dieldrin	60-57-1	0.004	0.0011	U	0.0011	U	0.0011	U	
Endrin	72-20-8	0.002	0.0014	U	0.0014	U	0.0014	U	
4,4'-DDD	72-54-8	0.3	0.0013	U	0.0013	U	0.0013	U	
Endosulfan II	33213-65-9	~	0.0015	U	0.0015	U	0.0015	U	
4,4'-DDT	50-29-3	0.2	0.0014	U	0.0014	U	0.0014	U	
Endosulfan sulfate	1031-07-8	~	0.0014	U	0.0014	U	0.0014	U	
Endrin Aldehyde	7421-93-4	5	0.001	U	0.001	U	0.001	U	
Methoxychlor	72-43-5	35	0.0014	U	0.0014	U	0.0014	U	
Endrin ketone	53494-70-5	5	0.0014	U	0.0014	U	0.0014	U	
Toxaphene	8001-35-2	0.06	0.39	U	0.39	U	0.39	U	
Chlordane	57-74-9	0.05	0.12	U	0.12	U	0.12	U	
2,4-D	94-75-7	50	13.5	U	13.5	U	13.5	U	
2,4,5-T	93-76-5	35	20.5	U	20.5	U	20.5	U	
Silvex(2,4,5-TP)	93-72-1	0.26	20.5	U	20.5	U	20.5	U	

Table 4  
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SampleID LabID Sampling Date ClientMatrix	NYSDEC TOGS Groundwater Quality Standards (GQS)	Water	TWP-01 1304264-3 04/23/2013		TWP-02 1304264-1 04/22/2013		TWP-03 1304264-2 04/22/2013	
			Water		Water		Water	
			Result	Q	Result	Q	Result	Q
		mg/L	mg/L		mg/L		mg/L	
<b>Metals, Dissolved - Target Analyte (TAL)</b>								
Aluminum	7429-90-5	~	0.86		0.25		0.025	U
Antimony	7440-36-0	~	0.009		0.009	U	0.009	U
Arsenic	7440-38-2	0.025	0.025		0.0038	U	0.0038	U
Barium	7440-39-3	1	0.47		0.28		0.35	
Beryllium	7440-41-7	~	0.001	U	0.001	U	0.001	U
Cadmium	7440-43-9	0.005	0.0006		0.0004	U	0.0004	U
Calcium	7440-70-2	~	157		215		148	
Chromium	7440-47-3	0.05	0.032		0.0037		0.0055	
Cobalt	7440-48-4	~	0.0044		0.00074	U	0.0024	
Copper	7440-50-8	0.2	0.018		0.005		0.0034	U
Iron	7439-89-6	~	3.87		2.28		16.7	
Lead	7439-92-1	0.025	0.13		0.036		0.024	
Magnesium	7439-95-4	35	17.4		26.9		17.4	
Manganese	7439-96-5	~	1.04		1.96		0.6	
Nickel	7440-02-0	~	0.036		0.0041		0.006	
Potassium	7440-09-7	~	12.4		19.6		21.1	
Selenium	7782-49-2	0.01	0.0064	U	0.0064	U	0.0064	U
Silver	7440-22-4	0.05	0.00066	U	0.00066	U	0.00066	U
Sodium	7440-23-5	~	45.3		70.5		78	
Thallium	7440-28-0	~	0.005	U	0.005	U	0.005	U
Vanadium	7440-62-2	~	0.00067	U	0.00067	U	0.00067	U
Zinc	7440-66-6	~	0.23		0.024		0.016	
<b>Metals, Target Analyte</b>		ug/L	mg/L		mg/L		mg/L	
Aluminum	7429-90-5	~	0.2		1.12		1.53	
Antimony	7440-36-0	~	0.009	U	0.009	U	0.009	U
Arsenic	7440-38-2	0.025	0.027		0.0038	U	0.0038	U
Barium	7440-39-3	1	0.4		0.34	U	0.5	
Beryllium	7440-41-7	~	0.001	U	0.001	U	0.001	U
Cadmium	7440-43-9	0.005	0.0004	U	0.0004	U	0.0004	U
Calcium	7440-70-2	~	165		254		206	
Chromium	7440-47-3	0.05	0.027		0.018		0.035	
Cobalt	7440-48-4	~	0.0038		0.00074	U	0.001	
Copper	7440-50-8	0.2	0.0091		0.024		0.0034	U
Iron	7439-89-6	~	3.72		2.54		25.7	
Lead	7439-92-1	0.025	0.14		0.049		0.086	
Magnesium	7439-95-4	35	17.6		29.3		23.7	
Manganese	7439-96-5	~	1.21		2.18		0.82	
Nickel	7440-02-0	~	0.014		0.019		0.064	
Potassium	7440-09-7	~	12.6		23.8		30.4	
Selenium	7782-49-2	0.01	0.0064	U	0.0064	U	0.0064	U
Silver	7440-22-4	0.05	0.00066	U	0.00066	U	0.00066	U
Sodium	7440-23-5	~	46.3		81.4		107	
Thallium	7440-28-0	~	0.005	U	0.005	U	0.005	U
Vanadium	7440-62-2	~	0.00067	U	0.00067	U	0.00067	U
Zinc	7440-66-6	~	0.092		0.12		0.49	
<b>Mercury by 7470/7471</b>		mg/L	mg/L		mg/L		mg/L	
Mercury	7439-97-6	0.0007	0.0031		0.00044		0.000054	
<b>Mercury, Dissolved</b>		mg/L	mg/L		mg/L		mg/L	
Mercury	7439-97-6	0.0007	0.0016		0.00038		0.000058	
<b>GC Fingerprint - EPA 310.14</b>		mg/L	mg/L		mg/L		mg/L	
Gasoline		~	0.1	U	0.1	U	0.1	U
Lubricating Oils		~	0.1	U	0.1	U	0.1	U
Kerosene/Jet Fuel		~	0.1	U	0.1	U	0.1	U
#2 Fuel Oil/Diesel		~	0.1	U	0.1	U	0.1	U
#4 Fuel Oil		~	0.1	U	0.1	U	0.1	U
#6 Fuel Oil		~	0.1	U	0.1	U	0.1	U
Dielectric Fluid		~	0.1	U	0.1	U	0.1	U
Mineral Spirit		~	0.1	U	0.1	U	0.1	U
NOTES:								
<b>BOLD=Compound detected above the method detection limit</b>								
<b>Any Regulatory Exceedences are color coded by Regulation</b>								
ND=Not Detected								
U=analyte not detected at or above the level indicated								
B=analyte found in the analysis batch blank								
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimatec								
D=result is from an analysis that required a dilution								
E=result is estimated and cannot be accurately reported due to levels encountered or interferences								
NT=this indicates the analyte was not a target for this sample								
~=this indicates that no regulatory limit has been established for this analyte								

Table 5  
Soil Vapor Results  
498 Leonard St, Brooklyn, NY

SampleID LabID Sampling Date DilutionFactor ClientMatrix		NYSDOH Guidance Levels 2006	Y63/SV-01 13D0913-01 04/24/2013 19.16 Soil Vapor		Y73/SV-02 13D0913-02 04/24/2013 72 Soil Vapor		Y26/SV-03 13D0913-03 04/24/2013 28.31 Soil Vapor	
Compound	CASNumber		Result ug/m <sup>3</sup>	Q	Result ug/m <sup>3</sup>	Q	Result ug/m <sup>3</sup>	Q
<b>Volatile Organics, EPA TO15 Full List</b>								
1,1,1-Trichloroethane	71-55-6	DOH Matrix 2	11	U	40	U	16	U
		< 100	NFA / Reasonable Action		NFA / Reasonable Action		NFA / Reasonable Action	
		100 - 1,000						
		1,000 and above						
1,1,2,2-Tetrachloroethane	79-34-5	~	13	U	50	U	20	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	~	15	U	56	U	22	U
1,1,2-Trichloroethane	79-00-5	~	11	U	40	U	16	U
1,1-Dichloroethane	75-34-3	~	7.9	U	30	U	12	U
1,1-Dichloroethylene	75-35-4	~	7.7	U	29	U	11	U
1,2,4-Trichlorobenzene	120-82-1	~	14	U	54	U	21	U
1,2,4-Trimethylbenzene	95-63-6	~	<b>110</b>	<b>D</b>	36	U	<b>75</b>	<b>D</b>
1,2-Dibromoethane	106-93-4	~	15	U	56	U	22	U
1,2-Dichlorobenzene	95-50-1	~	12	U	44	U	17	U
1,2-Dichloroethane	107-06-2	~	7.9	U	30	U	12	U
1,2-Dichloropropane	78-87-5	~	9.0	U	34	U	13	U
1,2-Dichlorotetrafluoroethane	76-14-2	~	14	U	51	U	20	U
1,3,5-Trimethylbenzene	108-67-8	~	<b>37</b>	<b>D</b>	36	U	<b>21</b>	<b>D</b>
1,3-Butadiene	106-99-0	~	8.4	U	32	U	12	U
1,3-Dichlorobenzene	541-73-1	~	12	U	44	U	17	U
1,4-Dichlorobenzene	106-46-7	~	12	U	44	U	17	U
1,4-Dioxane	123-91-1	~	7.0	U	26	U	10	U
2-Butanone	78-93-3	~	<b>95</b>	<b>D</b>	22	U	8.5	U
2-Hexanone	591-78-6	~	8.0	U	30	U	12	U
4-Methyl-2-pentanone	108-10-1	~	8.0	U	30	U	12	U
Acetone	67-64-1	~	<b>220</b>	<b>D</b>	<b>57</b>	<b>D</b>	<b>21</b>	<b>D</b>
Benzene	71-43-2	~	6.2	U	23	U	9.2	U
Benzyl chloride	100-44-7	~	10	U	38	U	15	U
Bromodichloromethane	75-27-4	~	12	U	45	U	18	U
Bromoform	75-25-2	~	20	U	76	U	30	U
Bromomethane	74-83-9	~	7.6	U	28	U	11	U
Carbon disulfide	75-15-0	~	<b>75</b>	<b>D</b>	<b>100</b>	<b>D</b>	<b>9.0</b>	<b>U</b>
Carbon tetrachloride	56-23-5	DOH Matrix 1	6.1	U	23	U	9.1	U
		< 5	NFA / Reasonable Action		NFA / Reasonable Action		NFA / Reasonable Action	
		5 - 50						
		50 - 250						
		250 and above						
Chlorobenzene	108-90-7	~	9.0	U	<b>47</b>	<b>D</b>	13	U
Chloroethane	75-00-3	~	5.1	U	19	U	7.6	U
Chloroform	67-66-3	~	9.5	U	36	U	14	U
Chloromethane	74-87-3	~	4.0	U	15	U	5.9	U
cis-1,2-Dichloroethylene	156-59-2	~	<b>29</b>	<b>D</b>	29	U	11	U
cis-1,3-Dichloropropylene	10061-01-5	~	8.8	U	33	U	13	U
Cyclohexane	110-82-7	~	<b>1100</b>	<b>D</b>	<b>78</b>	<b>D</b>	<b>12</b>	<b>D</b>
Dibromochloromethane	124-48-1	~	16	U	59	U	23	U
Dichlorodifluoromethane	75-71-8	~	9.6	U	36	U	14	U
Ethyl acetate	141-78-6	~	7.0	U	26	U	10	U
Ethyl Benzene	100-41-4	~	88	<b>D</b>	32	U	<b>43</b>	<b>D</b>
Hexachlorobutadiene	87-68-3	~	21	U	78	U	31	U
Isopropanol	67-63-0	~	<b>350</b>	<b>D</b>	18	U	7.1	U
Methyl Methacrylate	80-62-6	~	8.0	U	30	U	12	U
Methyl tert-butyl ether (MTBE)	1634-04-4	~	7.0	U	26	U	10	U
Methylene chloride	75-09-2	~	6.8	U	<b>43</b>	<b>D</b>	<b>13</b>	<b>D</b>
n-Heptane	142-82-5	~	8.0	U	30	U	<b>17</b>	<b>D</b>
n-Hexane	110-54-3	~	<b>100</b>	<b>D</b>	26	U	<b>11</b>	<b>D</b>
o-Xylene	95-47-6	~	<b>96</b>	<b>D</b>	32	U	<b>59</b>	<b>D</b>
p- & m- Xylenes	179601-23-1	~	<b>380</b>	<b>D</b>	<b>67</b>	<b>D</b>	<b>160</b>	<b>D</b>
p-Ethyltoluene	622-96-8	~	<b>120</b>	<b>D</b>	180	U	<b>82</b>	<b>D</b>
Propylene	115-07-01	~	3.4	U	13	U	5.0	U
Styrene	100-42-5	~	8.3	U	31	U	12	U
Tetrachloroethylene	127-18-4	DOH Matrix 2	<b>20</b>	<b>D</b>	50	U	20	U
		< 100	NFA / Reasonable Action		NFA / Reasonable Action		NFA / Reasonable Action	
		100 - 1,000						
		1,000 and above						
Tetrahydrofuran	109-99-9	~	5.7	U	22	U	8.5	U
Toluene	108-88-3	~	<b>200</b>	<b>D</b>	<b>44</b>	<b>D</b>	<b>90</b>	<b>D</b>
trans-1,2-Dichloroethylene	156-60-5	~	<b>12</b>	<b>D</b>	29	U	11	U
trans-1,3-Dichloropropylene	10061-02-6	~	8.8	U	33	U	13	U
Trichloroethylene	79-01-6	DOH Matrix 1	5.2	U	20	U	7.7	U
		< 5	NFA / Reasonable Action		NFA / Reasonable Action		NFA / Reasonable Action	
		5 - 50						
		50 - 250						
		250 and above						
Trichlorofluoromethane (Freon 11)	75-69-4	~	11	U	41	U	16	U
Vinyl acetate	108-05-4	~	6.9	U	26	U	10	U
Vinyl Chloride	75-01-4	~	5.0	U	19	U	7.4	U
<b>NOTES:</b>								
<b>BOLD = Compound detected above the method detection limit</b>								
<b>Any Regulatory Exceedences are color coded by Regulation</b>								
NFA = No Further Action								
Q is the Qualifier Column with definitions as follows:								
D = result is from an analysis that required a dilution								
U = analyte not detected at or above the level indicated								
~ = this indicates that no regulatory limit has been established for this analyte								

# **APPENDIX 1**

## **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and Mr. Jack Fung have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Brownfield Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC BCP, Global Paragon will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site is Mr. William Wong who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 341-0659.

**Project Contact List.**OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov).

**Repositories.**A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. ADC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

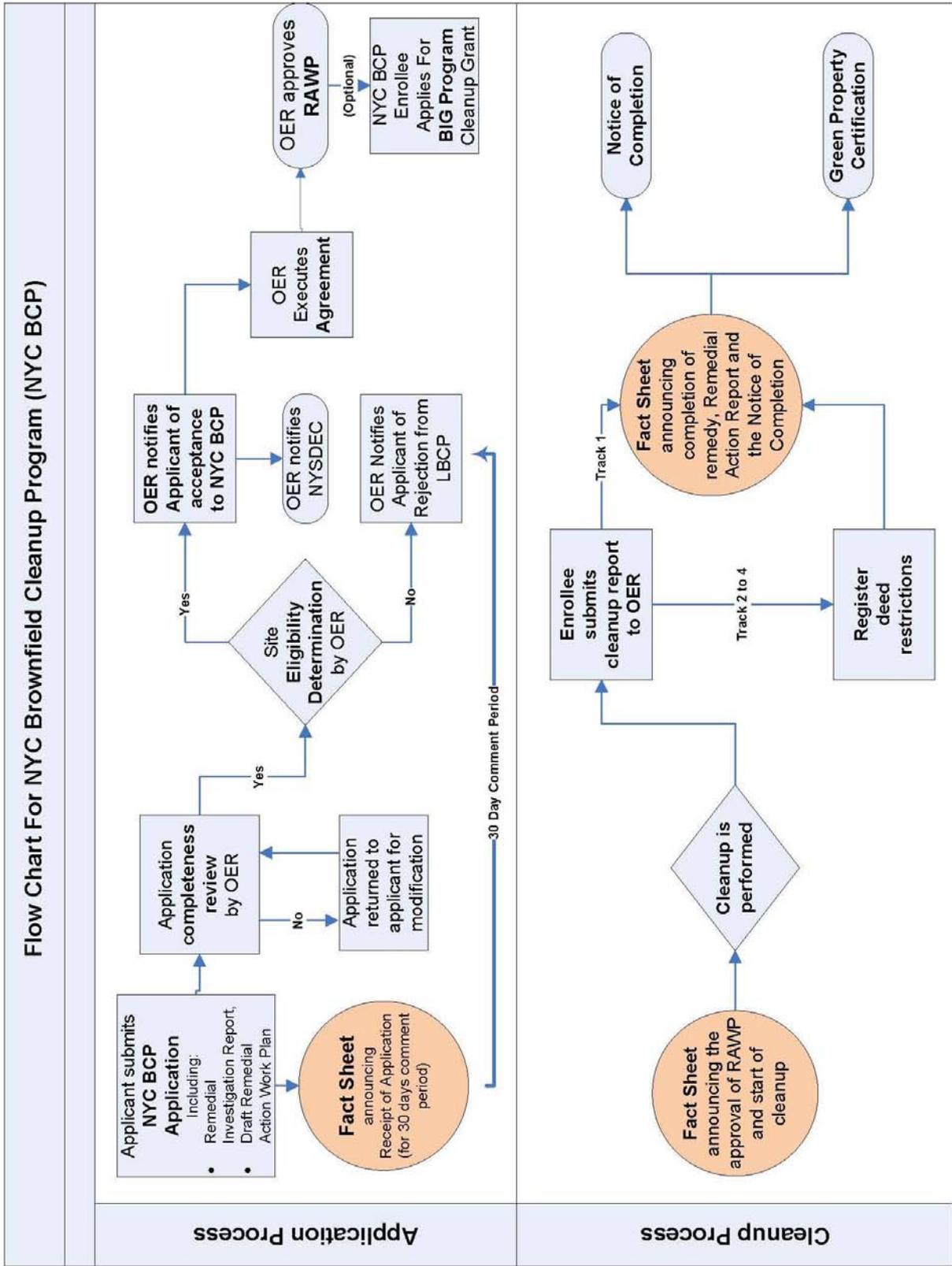
Brooklyn Public Library  
Greenpoint Branch  
107 Norman Avenue at Leonard Street  
Brooklyn, NY 11222

Please call (718) 349-8504 for hours of operation and OER website

<http://www.nyc.gov/html/oer/html/repository/RBrooklyn.shtml>

**Digital Documentation.** NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

**Public Notice and Public Comment.** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Global Paragon, reviewed and approved by OER prior to distribution and mailed by Global Paragon. Public comment is solicited in public notices for all work plans developed under the NYC Brownfield Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.



**Citizen Participation Milestones.** Public notice and public comment activities occur at several

steps during a typical NYC BCP project. See flow chart on the following page, which identifies when during the NYC BCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

## **APPENDIX 2**

### **SUSTAINABILITY STATEMENT**

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

**Reuse of Clean, Recyclable Materials.** Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

**Reduce Consumption of Virgin and Non-Renewable Resources.** Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

**Reduced Energy Consumption and Promotion of Greater Energy Efficiency.** Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**Conversion to Clean Fuels.** Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

**Recontamination Control.** Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

**Storm-water Retention.** Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

**Linkage with Green Building.** Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

**Paperless Brownfield Cleanup Program.** Global Paragon is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

**Low-Energy Project Management Program.** Global Paragon is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

**Trees and Plantings.** Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

## **APPENDIX 3**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 SOIL SCREENING METHODS**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

#### **1.2 STOCKPILE METHODS**

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

#### **1.3 CHARACTERIZATION OF EXCAVATED MATERIALS**

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

## **1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE**

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

## **1.5 OFF-SITE MATERIALS TRANSPORT**

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes will be provided to OER for review prior to construction. . The routing will take into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

## **1.6 MATERIALS DISPOSAL OFF-SITE**

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Brooklyn, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization

sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

## **1.7 MATERIALS REUSE ON-SITE**

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. ‘Reuse on-Site’ means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## **1.8 DEMARCATION**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer.

A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

## **1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

## **1.10 FLUIDS MANAGEMENT**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

## **1.11 STORM-WATER POLLUTION PREVENTION**

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

## **1.12 CONTINGENCY PLAN**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

## **1.13 ODOR, DUST AND NUISANCE CONTROL**

### **Odor Control**

All necessary means will be employed to prevent on- and off-Site odor 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) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. 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. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

### **Dust Control**

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.

- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

### **Other Nuisances**

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

## **APPENDIX 4**

### **HEALTH AND SAFETY PLAN**

A construction Health and Safety Plan (HASP) will be provided to OER for review prior to construction.

## **APPENDIX 5**

### **WARRANTY, PRODUCT AND INSTALLATION INFORMATION FOR VAPOR BARRIER SYSTEM**

Vapor barrier system warranty, product and installation information will be provided to OER for review prior to construction.

# **APPENDIX B**

## RegenOx and ORC Advanced Information



## DUST MINIMIZING FORMULATION FOR EXCAVATIONS, TANK PITS AND TRENCHES

### DESCRIPTION

ORC Advanced® Pellets (ORC-A Pellets) are a pelletized version of REGENESIS' widely used ORC Advanced and are designed specifically for direct application into excavations, tank pits and trenches. This pelletized, dry application material minimizes airborne dust while eliminating the need for specialized equipment and spray water required for powder-slurry applications. ORC Advanced Pellets are approximately 3-10 mm in size as shown in Figure 1.

### FEATURES & BENEFITS

- Optimal for use in excavations, tank pits and trenches where enhanced aerobic bioremediation is appropriate
- Pellet size (3-10 mm) minimizes airborne dust during handling and application of the material
- Dry application form eliminates need for water and equipment required for powder-slurry application types
- Patented technology provides long-term, controlled release oxygen for periods of up to 12 months on a single application
- Unique molecular structure delivers highest amount of active oxygen available, up to 15% by weight
- Contains micro-nutrients including: nitrogen, phosphorus and potassium (N,P,K) which may benefit aerobic microorganisms



FIGURE 1: ORC-A PELLETS ARE APPROXIMATELY 3-10 MM SIZE

### FUNCTION

The primary function of ORC-A Pellets is to provide a controlled-release oxygen source for the enhanced aerobic bioremediation of petroleum hydrocarbons or other aerobically degradable compounds. This is achieved through the use of patented processes which embed phosphates into the crystalline structure of solid peroxygen molecules. This feature slows the reaction that releases oxygen upon hydration, producing an optimized, controlled-release of oxygen over a period of up to 12 months. ORC-A Pellets deliver up to 15% active oxygen by weight and contain micro-nutrients such as: nitrogen, phosphorus, and potassium (N,P,K) which may be beneficial to aerobic biodegradation processes.

**Note: Due to the size of the pellets this material is not recommended or designed for use in direct-injection or fixed well applications.**



Oxygen Release Compound – Advanced Pellets (ORC Advanced® Pellets)  
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: March 22, 2012

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Section 1 - Material Identification

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Supplier:



**REGENESIS**

1011 Calle Sombra  
San Clemente, CA 92673

Phone: 949.366.8000

Fax: 949.366.8090

E-mail: [info@regenesis.com](mailto:info@regenesis.com)

**Chemical Description:** A mixture of Calcium Hydroxide Oxide [CaO(OH)<sub>2</sub>] and Calcium Hydroxide [Ca(OH)<sub>2</sub>].

**Chemical Family:** Inorganic Chemical

**Trade Name:** Advanced Formula Oxygen Release Compound  
(ORC Advanced® Pellets)

**Chemical Synonyms:** Calcium OxyHydroxide; Calcium Oxide Peroxide

**Product Use:** Used to remediate contaminated soil and groundwater  
(environmental applications)

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Section 2 – Composition

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<u>CAS No.</u>	<u>Chemical</u>
682334-66-3	Calcium Hydroxide Oxide [CaO(OH) <sub>2</sub> ]
1305-62-0	Calcium Hydroxide [Ca(OH) <sub>2</sub> ]
7758-11-4	Dipotassium Phosphate (HK <sub>2</sub> O <sub>4</sub> P)
7783-28-0	Ammonium Phosphate Dibasic [(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub> ]

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**Section 3 – Physical Data**

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<b>Form:</b>	tablets
<b>Color:</b>	White to Pale Yellow
<b>Odor:</b>	Odorless
<b>Melting Point:</b>	527 °F (275 °C) – Decomposes
<b>Boiling Point:</b>	Not Applicable (NA)
<b>Flammability/Flash Point:</b>	NA
<b>Auto-Flammability:</b>	NA
<b>Vapor Pressure:</b>	NA
<b>Self-Ignition Temperature:</b>	NA
<b>Thermal Decomposition:</b>	527 °F (275 °C) – Decomposes
<b>Bulk Density:</b>	0.5 – 0.65 g/ml (Loose Method)
<b>Solubility:</b>	1.65 g/L @ 68° F (20° C) for calcium hydroxide.
<b>Viscosity:</b>	NA
<b>pH:</b>	11-13 (saturated solution)
<b>Explosion Limits % by Volume:</b>	Non-explosive
<b>Hazardous Decomposition Products:</b>	Oxygen, Hydrogen Peroxide, Steam, and Heat
<b>Hazardous Reactions:</b>	None

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**Section 4 – Reactivity Data**

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**Stability:** Stable under certain conditions (see below).

**Conditions to Avoid:** Heat and moisture.

**Incompatibility:** Acids, bases, salts of heavy metals, reducing agents, and flammable substances.

**Hazardous Polymerization:** Does not occur.

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**Section 5 – Regulations**

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**TSCA Inventory List:** Listed

**CERCLA Hazardous Substance (40 CFR Part 302)**

**Listed Substance:** No

**Unlisted Substance:** Yes

**Reportable Quantity (RQ):** 100 pounds

**Characteristic(s):** Ignitibility

**RCRA Waste Number:** D001

**SARA, Title III, Sections 302/303 (40 CFR Part 355 – Emergency Planning and Notification)**

**Extremely Hazardous Substance:** No

**SARA, Title III, Sections 311/312 (40 CFR Part 370 – Hazardous Chemical Reporting: Community Right-To-Know)**

**Hazard Category:** Immediate Health Hazard  
Fire Hazard

## Regenesis - ORC Advanced® Pellets MSDS

**Threshold  
Planning Quantity:** 10,000 pounds

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### Section 5 – Regulations (cont)

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#### SARA, Title III, Section 313 (40 CFR Part 372 – Toxic Chemical Release Reporting: Community Right-To-Know)

**Extremely Hazardous  
Substance:** No

**WHMIS  
Classification:** C Oxidizing Material  
Poisonous and Infectious  
Material  
D Material Causing Other  
Toxic Effects –  
Eye and Skin Irritant

**Canadian Domestic  
Substance List:** Not Listed

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### Section 6 – Protective Measures, Storage and Handling

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#### Technical Protective Measures

**Storage:** Keep in tightly closed container. Store in dry area, protected from heat sources and direct sunlight.

**Handling:** Clean and dry processing pipes and equipment before operation. Never return unused product to the storage container. Keep away from incompatible products. Containers and equipment used to handle this product should be used exclusively for this material. Avoid contact with water or humidity.

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**Section 6 – Protective Measures, Storage and Handling (cont)**

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**Personal Protective Equipment (PPE)**

	<u>Calcium Hydroxide</u> ACGIH® TLV® (2000) 5 mg/m <sup>3</sup> TWA OSHA PEL Total dust–15 mg/m <sup>3</sup> TWA Respirable fraction– 5 mg/m <sup>3</sup> TWA NIOSH REL (1994) 5 mg/m <sup>3</sup>
<b>Engineering Controls:</b>	
<b>Respiratory Protection:</b>	For many conditions, no respiratory protection may be needed; however, in dusty or unknown atmospheres use a NIOSH approved dust respirator.
<b>Hand Protection:</b>	Impervious protective gloves made of nitrile, natural rubber or neoprene.
<b>Eye Protection:</b>	Use chemical safety goggles (dust proof).
<b>Skin Protection:</b>	For brief contact, few precautions other than clean clothing are needed. Full body clothing impervious to this material should be used during prolonged exposure.
<b>Other:</b>	Safety shower and eyewash stations should be present. Consultation with an industrial hygienist or safety manager for the selection of PPE suitable for working conditions is suggested.
<b>Industrial Hygiene:</b>	Avoid contact with skin and eyes.
<b>Protection Against Fire &amp; Explosion:</b>	NA

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**Section 7 – Hazards Identification**

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<b>Emergency Overview:</b>	Oxidizer – Contact with combustibles may cause a fire. This material decomposes and releases oxygen in a fire. The additional oxygen may intensify the fire.
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## Regenesis - ORC Advanced® Pellets MSDS

<b>Potential Health Effects:</b>	Irritating to the mucous membrane and eyes. If the product splashes in ones face and eyes, treat the eyes first. Do not dry soiled clothing close to an open flame or heat source. Any clothing that has been contaminated with this product should be submerged in water prior to drying.
<b>Inhalation:</b>	High concentrations may cause slight nose and throat irritation with a cough. There is risk of sore throat and nose bleeds if one is exposed to this material for an extended period of time.
<b>Eye Contact:</b>	Severe eye irritation with watering and redness. There is also the risk of serious and/or permanent eye lesions.
<b>Skin Contact:</b>	Irritation may occur if one is exposed to this material for extended periods.
<b>Ingestion:</b>	Irritation of the mouth and throat with nausea and vomiting.

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### Section 8 – Measures in Case of Accidents and Fire

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<b>After Spillage/Leakage/Gas Leakage:</b>	Collect in suitable containers. Wash remainder with copious quantities of water.
<b>Extinguishing Media:</b>	See next.
<b>Suitable:</b>	Large quantities of water or water spray. In case of fire in close proximity, all means of extinguishing are acceptable.
<b>Further Information:</b>	Self contained breathing apparatus or approved gas mask should be worn due to small particle size. Use extinguishing media appropriate for surrounding fire. Apply cooling water to sides of transport or storage vessels that are exposed to flames until the fire is extinguished. Do not approach hot vessels that contain this product.
<b>First Aid:</b>	After contact with skin, wash immediately with plenty of water and soap. In case of contact with eyes, rinse immediately with plenty of water and seek medical attention. Consult an ophthalmologist in all cases.

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### Section 8 – Measures in Case of Accidents and Fire

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<b>Eye Contact:</b>	Flush eyes with running water for 15 minutes, while keeping the eyelids wide open. Consult with an ophthalmologist in all cases.
<b>Inhalation:</b>	Remove subject from dusty environment. Consult with a physician in case of respiratory symptoms.
<b>Ingestion:</b>	If the victim is conscious, rinse mouth and administer fresh water. DO NOT induce vomiting. Consult a physician in all cases.
<b>Skin Contact:</b>	Wash affected skin with running water. Remove and clean clothing. Consult with a physician in case of persistent pain or redness.
<b>Special Precautions:</b>	Evacuate all non-essential personnel. Intervention should only be done by capable personnel that are trained and aware of the hazards associated with this product. When it is safe, unaffected product should be moved to safe area.
<b>Specific Hazards:</b>	<u>Oxidizing substance</u> . Oxygen released on exothermic decomposition may support combustion. Confined spaces and/or containers may be subject to increased pressure. If product comes into contact with flammables, fire or explosion may occur.

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### Section 9 – Accidental Release Measures

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<b>Precautions:</b>	Observe the protection methods cited in Section 3. Avoid materials and products that are incompatible with product. Immediately notify the appropriate authorities in case of reportable discharge (> 100 lbs).
<b>Cleanup Methods:</b>	Collect the product with a suitable means of avoiding dust formation. All receiving equipment should be clean, vented, dry, labeled and made of material that this product is compatible with. Because of the contamination risk, the collected material should be kept in a safe isolated place. Use large quantities of water to clean the impacted area. See Section 12 for disposal methods.

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### Section 10 – Information on Toxicology

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#### Toxicity Data

	Oral Route, LD <sub>50</sub> , rat, > 2,000 mg/kg (powder 50%)
<b>Acute Toxicity:</b>	Dermal Route, LD <sub>50</sub> , rat, > 2,000 mg/kg (powder 50%) Inhalation, LD <sub>50</sub> , rat, > 5,000 mg/m <sup>3</sup> (powder 35%)
<b>Irritation:</b>	Rabbit (eyes), severe irritant
<b>Sensitization:</b>	No data
<b>Chronic Toxicity:</b>	In vitro, no mutagenic effect (Powder 50%)
<b>Target Organ Effects:</b>	Eyes and respiratory passages.

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### Section 11 – Information on Ecology

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#### Ecology Data

	10 mg Ca(OH) <sub>2</sub> /L: pH = 9.0 100 mg Ca(OH) <sub>2</sub> /L: pH = 10.6
<b>Acute Exotoxicity:</b>	Fishes, Cyprinus carpio, LC <sub>50</sub> , 48 hrs, 160 mg/L Crustaceans, Daphnia sp., EC <sub>50</sub> , 24 hours, 25.6 mg/L (Powder 16%)
<b>Mobility:</b>	Low Solubility and Mobility  Water – Slow Hydrolysis. Degradation Products: Calcium Hydroxide
<b>Abiotic Degradation:</b>	Water/soil – complexation/precipitation. Carbonates/sulfates present at environmental concentrations.  Degradation products: carbonates/sulfates sparingly soluble
<b>Biotic Degradation:</b>	NA (inorganic compound)
<b>Potential for Bioaccumulation:</b>	NA (ionizable inorganic compound)



**Reason for Issue:**

Update toxicological and ecological data

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**Section 15 – Further Information**

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**The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available.**

# REGENESIS ORC ADVANCED® PELLETS

Dust Minimizing Formulation for Excavations, Tank Pits and Trenches

## PRODUCT APPLICATION INSTRUCTIONS

### Introduction

The features and benefits of controlled-release, ORC Advanced are posted in other areas (product brochure, [www.regenesis.com](http://www.regenesis.com), and MSDS). From the field application standpoint, the benefits of ORC Advanced® Pellets (ORC-A Pellets) are in ease of handling and Health & Safety. Pelletized ORC Advanced is much easier to use because it eliminates the need for water and equipment associated with spray application and Health & Safety are dramatically improved by elimination of ORC Advanced dust and associated respiration issues. The later feature makes the material much easier to handle in open-air application approaches such as excavations and trenches.

### Design Considerations

The new configuration of this material does not change the quantity estimated in the design process. The materials' available oxygen is up to 17% by weight and its physical attributes are designed to be easier to handle through the use of a pelletized version of the product and the elimination of the dust associated with dry application of ORC Advanced powder.

### Application Methods

The pelletized form allows the user to simply and easily apply the ORC Advanced in a dry format using existing on-site operations or by manual methods. Some typical methods include:

- Application via the excavator bucket:
  - Simply insert a pre-determined quantity (unit - bucket or bag) of ORC-A Pellets into an excavator bucket and use the excavator to mix and distribute the ORC-A Pellets into previously backfilled soil
- Application via manual or mechanical broadcasting/spreaders:
  - Manually or mechanically broadcast/spread pelletized ORC-A Pellets into the excavation at a pre-determined rate per unit of backfill material or per soil lift (as the soil is being backfilled)
  - Follow the manual broadcast step with mechanically mixing the ORC-A Pellets directly into the backfill using the excavator equipment

### Example Estimates:

Using an example unit weight of ORC-A Pellets (40 lb. bag)

For a 0.1% weight of ORC-Advanced to backfill:

- Each 100,000 lbs. of soil
- Apply 100 lbs. (4 buckets) ORC-A Pellets

# REGENESIS ORC ADVANCED® PELLETS

Dust Minimizing Formulation for Excavations, Tank Pits and Trenches

## PRODUCT APPLICATION INSTRUCTIONS

For a 0.2% weight of ORC-Advanced to backfill:

- Each 100,000 lbs. of soil
- Apply 200 lbs. (approx. 5 bags) ORC-A Pellets

### Example Estimates (SI Units):

Using an example unit weight of ORC-A Pellets ( 18.1 kg bag)

For a 0.1% weight of ORC-A Pellets to backfill:

- Each 45 metric tons of soil
- Apply 45 kg (approx. 3 bags) ORC-A Pellets

For a 0.2% weight of ORC-A Pellets to backfill:

- Each 90 metric tons of soil
- Apply 90 kg (approx. 5 bags) ORC-A Pellets

# RegenOx™

## CHEMICAL OXIDATION REDEFINED...

*RegenOx™ is an advanced in situ chemical oxidation technology\* designed to treat organic contaminants including high concentration source areas in the saturated and vadose zones*

### PRODUCT FEATURES:

- Rapid and sustained oxidation of target compounds
- Easily applied with readily available equipment
- Destroys a broad range of contaminants
- More efficient than other solid oxidants
- Enhances subsequent bioremediation
- Avoids detrimental impacts to groundwater aquifers



*RegenOx product application*

### HOW IT WORKS:

RegenOx maximizes in situ performance using a solid alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. The product is delivered as two parts that are combined and injected into the subsurface using common drilling or direct-push equipment. Once in the subsurface, the combined product produces an effective oxidation reaction comparable to that of Fenton's Reagent without a violent exothermic reaction. RegenOx safely, effectively and rapidly destroys a wide range of contaminants in both soil and groundwater (Table 1).

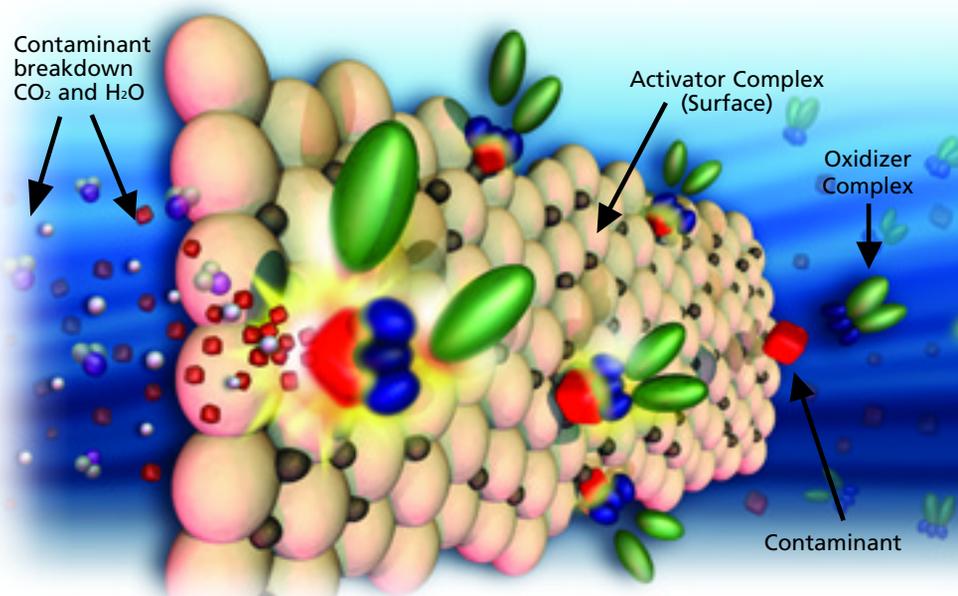
### ACHIEVES RAPID OXIDATION VIA A NUMBER OF MECHANISMS

RegenOx directly oxidizes contaminants while its unique catalytic complex generates a suite of highly charged, oxidative free radicals that are responsible for the rapid destruction of contaminants. The mechanisms by which RegenOx operates are:

- **Surface-Mediated Oxidation:** (see Figure 1 and description below)
- **Direct Oxidation:**  $C_2Cl_4 + 2 Na_2CO_3 + 3 H_2O_2 + 2 H_2O \leftrightarrow 2CO_2 + 4 NaCl + 4 H_2O + 2 H_2CO_3$
- **Free Radical Oxidation:**
  - Peroxy Radical ( $HO_2\bullet$ )
  - Hydroxyl Radical ( $OH\bullet$ )
  - Superoxide Radical ( $O_2\bullet$ )

Figure 1. Surface-Mediated Oxidation is responsible for the majority of RegenOx contaminant destruction. This process takes place in two stages. First, the RegenOx activator complex coats the subsurface. Second, the oxidizer complex and contaminant react with the activator complex surface destroying the contaminant.

Figure 1. RegenOx™ Surface-Mediated Oxidation



\* Patent applied for



### From Mass Reduction to Bioremediation:

RegenOx™ is an effective and rapid contaminant mass reduction technology. A single injection will remove significant amounts of target contaminants from the subsurface. Strategies employing multiple Regenox injections coupled with follow-on accelerated bioremediation can be used to treat highly contaminated sites to regulatory closure. In fact, RegenOx was designed specifically to allow for a seamless transition to low-cost accelerated bioremediation using any of Regenesis controlled release compounds.

### Significant Longevity:

RegenOx has been shown to destroy contaminants for periods of up to one month.

### Product Application Made Safe and Easy:

RegenOx produces minimal heat and as with all oxidants proper health and safety procedures must be followed. The necessary safety guidance accompanies all shipments of RegenOx and additional resources are available on request. Through the use of readily available, highly mobile, direct-push equipment and an array of pumps, RegenOx has been designed to be as easy to install as other Regenesis products like ORC® and HRC®.

### Effective on a Wide Range of Contaminants:

RegenOx has been rigorously tested in both the laboratory and the field on petroleum hydrocarbons (aliphatics and aromatics), gasoline oxygenates (e.g., MTBE and TAME), polyaromatic hydrocarbons (e.g., naphthalene and phenanthrene) and chlorinated hydrocarbons (e.g., PCE, TCE, TCA).

### Oxidant Effectiveness vs. Contaminant Type:

Table 1

Contaminant	RegenOx™	Fenton's Reagent	Permanganate	Persulfate	Activated Persulfate	Ozone
Petroleum Hydrocarbons	A	A	B	B	B	A
Benzene	A	A	D	B	B	A
MTBE	A	B	B	C	B	B
Phenols	A	A	B	C	B	A
Chlorinated Ethenes (PCE, TCE, DCE, VC)	A	A	A	B	A	A
Chlorinated Ethanes (TCA, DCA)	A	B	C	D	C	B
Polycyclic Aromatic Hydrocarbons (PAHs)	A	A	B	B	A	A
Polychlorinated Biphenyls (PCBs)	B	C	D	D	D	B
Explosives (RDX, HMX)	A	A	A	A	A	A

Based on laboratory kinetic data, thermodynamic calculations, and literature reports.

#### Oxidant Effectiveness Key:

- A = Short half life, low free energy (most energetically favored), most complete
- B = Intermediate half life, low free energy, intermediate degree of completion
- C = Intermediate half life, intermediate free energy, low degree of completion
- D = Long half life, high free energy (least favored), very low degree of completion



Advanced Technologies for Groundwater Resources

1011 Calle Sombra / San Clemente / California 92673-6244  
Tel: 949/366-8000 / Fax: 949/366-8090 / www.regenesis.com

## RegenOx® – Part A (Oxidizer Complex)

### Material Safety Data Sheet (MSDS)

Last Revised: September 27, 2013

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#### Section 1 – Supplier Information and Material Identification

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**Supplier:**



**REGENESIS**

1011 Calle Sombra  
San Clemente, CA 92673  
Telephone: 949.366.8000  
Fax: 949.366.8090  
E-mail: info@regenesis.com

Chemical Description: A mixture of sodium percarbonate [2Na<sub>2</sub>CO<sub>3</sub>·3H<sub>2</sub>O<sub>2</sub>], sodium carbonate [Na<sub>2</sub>CO<sub>3</sub>], sodium silicate and silica gel.

Chemical Family: Inorganic Chemicals

Trade Name: RegenOx® – Part A (Oxidizer Complex)

Product Use: Used to remediate contaminated soil and groundwater (environmental applications)

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#### Section 2 – Chemical Information/Other Designations

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<u>CAS No.</u>	<u>Chemical</u>	<u>Percentage</u>
15630-89-4	Sodium Percarbonate	60 -100 %
7699-11-6	Silicic Acid	< 1 %
63231-67-4	Silica Gel	< 1 %

---

#### Section 3 – Physical Data

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**Form:** Powder

**Color:** White

**Odor:** Odorless

**Melting Point:** NA

**Boiling Point:** NA

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**Section 3 – Physical Data (cont)**


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<b>Flammability/Flash Point:</b>	NA
<b>Vapor Pressure:</b>	NA
<b>Bulk Density:</b>	0.9 – 1.2 g/cm <sup>3</sup>
<b>Solubility:</b>	Min 14.5g/100g water @ 20 °C
<b>Viscosity:</b>	NA
<b>pH (3% solution):</b>	≈ 10.5
<b>Decomposition Temperature:</b>	Self-accelerating decomposition with oxygen release starts at 50 °C.

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**Section 4 – Reactivity Data**


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<b>Stability:</b>	Stable under normal conditions
<b>Conditions to Avoid/Incompatibility:</b>	Acids, bases, salts of heavy metals, reducing agents, and flammable substances
<b>Hazardous Decomposition Products:</b>	Oxygen. Contamination with many substances will cause decomposition. The rate of decomposition increases with increasing temperature and may be very vigorous with rapid generation of oxygen and steam.

---

**Section 5 – Regulations**


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<b>TSCA Inventory Listed:</b>	Yes
<b>CERCLA Hazardous Substance (40 CFR Part 302)</b>	
<b>Listed Substance:</b>	<i>No</i>
<b>Unlisted Substance:</b>	<i>Yes</i>
<b>SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know</b>	
<b>Extremely Hazardous Substance:</b>	No
<b>WHMIS Classification:</b>	C, D2B
<b>Canadian Domestic Substance List:</b>	Appears

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## Section 6 – Protective Measures, Storage and Handling

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### Technical Protective Measures

- Storage:** Oxidizer. Store in a cool, well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 °C.
- Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers.
- Protect from moisture. Do not store near combustible materials. Keep containers well sealed.
- Store separately from reducing materials. Avoid contamination which may lead to decomposition.
- Handling:** Avoid contact with eyes, skin and clothing. Use with adequate ventilation.
- Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area.
- Label containers and keep them tightly closed when not in use.
- Wash hands thoroughly after handling.

### Personal Protective Equipment (PPE)

- Engineering Controls:** General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis.
- Respiratory Protection:** For many conditions, no respiratory protection is necessary; however, in dusty or unknown conditions or when exposures exceed limit values a NIOSH approved respirator should be used.
- Hand Protection:** Wear chemical resistant gloves (neoprene, rubber, or PVC).

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### Section 6 – Protective Measures, Storage and Handling (cont)

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<b>Eye Protection:</b>	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
<b>Skin Protection:</b>	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
<b>Other:</b>	Eye wash station.
<b>Protection Against Fire &amp; Explosion:</b>	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers.

---

### Section 7 – Hazards Identification

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#### Potential Health Effects

<b>Inhalation:</b>	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
<b>Eye Contact:</b>	Causes irritation, redness and pain.
<b>Skin Contact:</b>	Causes slight irritation.
<b>Ingestion:</b>	May be harmful if swallowed (vomiting and diarrhea).

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### Section 8 – Measures in Case of Accidents and Fire

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<b>After Spillage/Leakage:</b>	Eliminate all ignition sources. Evacuate unprotected personnel and never exceed any occupational exposure limit. Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.
<b>Extinguishing Media:</b>	Water
<b>First Aid</b>	
<b>Eye Contact:</b>	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
<b>Inhalation:</b>	Remove affected person to fresh air. Seek medical attention if the effects persist.
<b>Ingestion:</b>	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. <b>Do Not</b> induce vomiting.

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**Section 8 – Measures in Case of Accidents and Fire (cont)**

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**Skin Contact:** Wash affected areas with soap and a mild detergent and large amounts of water.

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**Section 9 – Accidental Release Measures**

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**Precautions:**

**Cleanup Methods:** Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.

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**Section 10 – Information on Toxicology**

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**Toxicity Data**

**LD50 Oral (rat):** 2,400 mg/kg  
**LD50 Dermal (rabbit):** Min 2,000 mg/kg  
**LD50 Inhalation (rat):** Min 4,580 mg/kg

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**Section 11 – Information on Ecology**

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**Ecology Data**

**Ecotoxicological Information:** NA

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**Section 12 – Disposal Considerations**

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**Waste Disposal Method**

**Waste Treatment:** Dispose of in an approved waste facility operated by an authorized contactor in compliance with local regulations.

**Package (Pail) Treatment:** The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

---

### Section 13 – Shipping/Transport Information

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<b>D.O.T. Shipping Name:</b>	Oxidizing Solid, N.O.S. [A mixture of sodium percarbonate [2Na <sub>2</sub> CO <sub>3</sub> ·3H <sub>2</sub> O <sub>2</sub> ], sodium carbonate [Na <sub>2</sub> CO <sub>3</sub> ], sodium silicate and silica gel.]
<b>UN Number:</b>	1479
<b>Hazard Class:</b>	5.1
<b>Labels:</b>	5.1 (Oxidizer)
<b>Packaging Group:</b>	III

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### Section 14 – Other Information

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<b>HMIS<sup>®</sup> Rating</b>	Health – 1 (slight)	Reactivity – 1 (slight)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat

HMIS<sup>®</sup> is a registered trademark of the National Painting and Coating Association.

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### Section 15 – Further Information

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**The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.**

## RegenOx® – Part B (Activator Complex)

### Material Safety Data Sheet (MSDS)

Last Revised: June 4, 2010

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#### Section 1 – Supplier Information and Material Identification

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**Supplier:**



### REGENESIS

1011 Calle Sombra  
San Clemente, CA 92673  
Telephone: 949.366.8000  
Fax: 949.366.8090  
E-mail: info@regenesis.com

Chemical Description: A mixture of sodium silicate solution, silica gel and ferrous sulfate

Chemical Family: Inorganic Chemicals

Trade Name: RegenOx® – Part B (Activator Complex)

Product Use: Used for environmental remediation of contaminated soils and groundwater

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#### Section 2 – Chemical Information/Other Designations

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<u>CAS No.</u>	<u>Chemical</u>
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel
7720-78-7	Ferrous Sulfate
7732-18-5	Water

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#### Section 3 – Physical Data

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**Form:** Liquid

**Color:** Blue/Green

**Odor:** Odorless

**Melting Point:** NA

**Boiling Point:** NA

**Flammability/Flash Point:** NA

**Vapor Pressure:** NA

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**Section 3 – Physical Data ( cont)**


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<b>Specific Gravity</b>	1.39 g/cm <sup>3</sup>
<b>Solubility:</b>	Miscible
<b>Viscosity:</b>	NA
<b>pH (3% solution):</b>	11
<b>Hazardous Decomposition Products:</b>	Oxides of carbon and silicon may be formed when heated to decomposition.

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**Section 4 – Reactivity Data**


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<b>Stability:</b>	Stable under normal conditions.
<b>Conditions to Avoid:</b>	None.
<b>Incompatibility:</b>	Avoid hydrogen fluoride, fluorine, oxygen difluoride, chlorine trifluoride, strong acids, strong bases, oxidizers, aluminum, fiberglass, copper, brass, zinc, and galvanized containers.

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**Section 5 – Regulations**


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<b>TSCA Inventory Listed:</b>	Yes
<b>CERCLA Hazardous Substance (40 CFR Part 302)</b>	
<b>Listed Substance:</b>	No
<b>Unlisted Substance:</b>	Yes
<b>SARA, Title III, Sections 302/303 (40 CFR Part 355) – Emergency Planning and Notification</b>	
<b>Extremely Hazardous Substance:</b>	No
<b>SARA, Title III, Sections 311/312 (40 CFR Part 370) – Hazardous Chemical Reporting: Community Right-To-Know</b>	
<b>Hazard Category:</b>	Acute
<b>SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know</b>	
<b>Extremely Hazardous Substance:</b>	No

---

**Section 6 – Protective Measures, Storage and Handling**

---

**Technical Protective Measures**

**Storage:** Keep in a tightly closed container (steel or plastic) and store in a cool, well ventilated area away from all incompatible materials (acids, reactive metals, and ammonium salts). Store in a dry location away from heat above 60 degrees C and colder than 10 degrees C. Do not store in aluminum, fiberglass, copper, brass, zinc or galvanized containers.

**Handling:** Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. Use with adequate ventilation.  
Do not use product if it is brownish-yellow in color.

**Personal Protective Equipment (PPE)**

**Engineering Controls:** General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Safety shower and eyewash station should be within direct access.

**Respiratory Protection:** Use NIOSH-approved dust and mist respirator where spray mist exists. Respirators should be used in accordance with 29 CFR 1910.134.

**Hand Protection:** Wear chemical resistant gloves.

**Eye Protection:** Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.

**Skin Protection:** Try to avoid skin contact with this product. Gloves and protective clothing should be worn during use.

**Other:**

**Protection Against Fire & Explosion:** Product is non-explosive and non-combustible.

---

## Section 7 – Hazards Identification

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### Potential Health Effects

<b>Inhalation:</b>	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
<b>Eye Contact:</b>	Causes irritation, redness and pain.
<b>Skin Contact:</b>	Causes irritation. Symptoms include redness, itching and pain.
<b>Ingestion:</b>	May cause irritation to mouth, esophagus, and stomach.

---

## Section 8 – Measures in Case of Accidents and Fire

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<b>After Spillage/Leakage (small):</b>	Mop up and neutralize liquid, then discharge to sewer in accordance with local, state and federal regulations.
<b>After Spillage/Leakage (large):</b>	Keep unnecessary personnel away; isolate hazard area and do not allow entrance into the affected area. Do not touch or walk through spilled material. Stop leak if possible without risking injury. Prevent runoff from entering into storm sewers and ditches that lead to natural waterways. Isolate the material if at all possible. Sand or earth may be used to contain the spill. If containment is not possible, neutralize the contaminated area and flush with large quantities of water.
<b>Extinguishing Media:</b>	Material is compatible with all extinguishing media.
<b>Further Information:</b>	
<b>First Aid</b>	
<b>Eye Contact:</b>	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
<b>Inhalation:</b>	Remove affected person to fresh air. Give artificial respiration if individual is not breathing. If breathing is difficult, give oxygen. Seek medical attention if the effects persist.
<b>Ingestion:</b>	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. <b><u>DO NOT</u></b> induce vomiting.
<b>Skin Contact:</b>	Wash affected areas with soap and a mild detergent and large amounts of water. Remove contaminated clothing and shoes.

---

**Section 9 – Accidental Release Measures**

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**Precautions:**

**PPE:** Wear chemical goggles, body-covering protective clothing, chemical resistant gloves, and rubber boots (see Section 6).

**Environmental Hazards:** Sinks and mixes with water. High pH of this material may be harmful to aquatic life. Only water will evaporate from a spill of this material.

**Cleanup Methods:** Pick-up and place in an appropriate container for reclamation or disposal. US regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

---

**Section 10 – Information on Toxicology**

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**Toxicity Data**

**Sodium Silicate:** When tested for primary eye irritation potential according to OECD Guidelines, Section 405, a similar sodium silicate solution produced corneal, iridal and conjunctival irritation. Some eye irritation was still present 14 days after treatment, although the average primary irritation score has declined from 29.7 after 1 day to 4.0 after 14 days. When tested for primary skin irritation potential, a similar sodium silicate solution produced irritation with a primary irritation index of 3 to abraded skin and 0 to intact skin. Human experience confirms that irritation occurs when sodium silicates get on clothes at the collar, cuffs, or other areas where abrasion may exist.

The acute oral toxicity of this product has not been tested.

**Ferrous Sulfate:** LD50 Oral (rat): 319 mg/kg not a suspected carcinogen.

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### Section 11 – Information on Ecology

---

#### Ecology Data

**Ecotoxicological Information:** Based on 100% solid sodium silicate, a 96 hour median tolerance for fish of 2,320 mg/l; a 96 hour median tolerance for water fleas of 247 mg/L; a 96 hour median tolerance for snail eggs of 632 mg/L; and a 96 hour median tolerance for Amphipoda of 160 mg/L.

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### Section 12 – Disposal Considerations

---

#### Waste Disposal Method

**Waste Treatment:** Neutralize and landfill solids in an approved waste facility operated by an authorized contactor in compliance with local regulations.

**Package (Pail) Treatment:** The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

---

### Section 13 – Shipping/Transport Information

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**D.O.T.** This product is not regulated as a hazardous material so there are no restrictions.

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### Section 14 – Other Information

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<b>HMIS<sup>®</sup> Rating</b>	Health – 2 (moderate)	Reactivity – 0 (none)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat
	Contact – 1 (slight)	

HMIS<sup>®</sup> is a registered trademark of the National Painting and Coating Association.

---

### Section 15 – Further Information

---

**The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.**



## RegenOx™ *In Situ* Chemical Oxidation Application Instructions

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### Using Direct-Push Injection (Step-by-Step Procedures)

RegenOx™ is the new generation of chemical oxidation. RegenOx™ is a proprietary (patent-applied-for) *in situ* chemical oxidation process using a solid oxidant complex (sodium percarbonate/catalytic formulation) and an activator complex (a composition of ferrous salt embedded in a micro-scale catalyst gel). RegenOx™ with its catalytic system has very high activity, capable of treating a very broad range of soil and groundwater contaminants including both petroleum hydrocarbons and chlorinated solvents.

#### Instructions

- 1) Prior to the installation of RegenOx™, any surface or overhead impediments should be identified as well as the location of all underground structures. Underground structures include but are not limited to utility lines; tanks; distribution piping; sewers; drains; and landscape irrigation systems. The planned installation locations should be adjusted to account for all impediments and obstacles. These considerations should be part of the SSHP or HASP.
- 2) Pre-mark the installation locations, noting any points that may have different vertical application requirements or total depth.
- 3) Set up the direct push unit over each point and follow the manufacturer standard operating procedures (SOP) for the direct push equipment. Care should be taken to assure that probe holes remain in the vertical.
- 4) For most applications, Regenesis suggests using 1.5-inch O.D./0.625-inch I.D drive rods. However, some applications may require the use of 2.125-inch O.D./1.5-inch I.D. or larger drive rods.
- 5) Advance drive rods through the surface pavement, as necessary, following SOP.
- 6) Push the drive rod assembly with an expendable tip to the desired maximum depth. Regenesis suggests pre-counting the number of drive rods needed to reach depth prior to starting injection activities.
- 7) After the drive rods have been pushed to the desired depth, the rod assembly should be withdrawn three to six inches. Then the expendable tip can be dropped from the drive rods, following SOP. If an injection tool was used instead of an expendable tip, the application of material can take place without any preliminary withdrawal of the rods.

- 8) In some cases, introduction of a large column of air prior to RegenOx™ application may be problematic because the air can block water flow to the treatment area. This is particularly the case in deep injections (>50 ft) with large diameter rods (>1.5-inch O.D.). To prevent the injection of air into the aquifer during RegenOx™ application, as well as to prevent problems associated with heaving sands, fill the drive rods with water, or the RegenOx™ mixture prior dropping the expendable tip or exposing the injection tool.
- 9) The RegenOx™ percent of the oxidizer in solution should range between 3% to 5%. Although solutions up to 8% may be used, this will likely increase the difficulty of injection due to reactivity. Solutions with greater than 8% oxidizer in solution will result in excess reaction and flocculation prior to injection and are not typically recommended

Measure the appropriate quantity of RegenOx™ Oxidizer for one to four vertical foot of injection into a 55 gallon drum or mixing tank. The volume of water per injection location can be calculated from the following formula:

$$\frac{\text{RegenOx Oxidizer lbs/foot}}{(8.34 \text{ lbs/gal water})(\% \text{ RegenOx\_Oxidizer solids})} [1 - (\% \text{ RegenOx\_Oxidizer solids})]$$

Tighter formations (clays and silts), and even some fine sand formations will likely require higher oxidant percentages since less volume can be injected per location. The following are guides to various RegenOx™ mixing ratios based on the above equation.

- to make a roughly 3% oxidant solution for every 10 lbs of oxidant and 10 lbs of activator (20 lbs total RegenOx™), use 38 gallons of water.
  - to make a roughly 4% oxidant solution for every 10 lbs of oxidant and 10 lbs of activator (20 lbs total RegenOx™), use 28 gallons of water.
  - to make a roughly 5% oxidant solution for every 10 lbs of oxidant and 10 lbs of activator (20 lbs total RegenOx™), use 22 gallons of water.
- 10) Pour the pre-measured quantity of RegenOx™ Oxidizer into the pre-measured volume of water to make the desired target % oxidant in solution. NOTE: always pour the Oxidizer into water, do not pour water into the Oxidizer. Mix the water and oxidant with a power drill and paint stirrer or other mechanical mixing device to ensure that the Oxidizer has dissolved in the water.

- 11) Pour the applicable quantity of the pre-mixed RegenOx™ Activator into the oxidant:water solution. Mix the Oxidant and Activator using a power drill paint stirrer or other mechanical mixing device for at least 5 minutes until a homogenous mixture is formed. After mixing the RegenOx™ mixture should be injected into the subsurface as soon as possible.
- 12) Do not mix more RegenOx™ material than will be used over roughly 1 to 4 feet of injection so as to minimize potential above ground reaction/flocculation prior to injection.

Transfer the contents of the mixing tank to the pump using gravity feed or appropriate transfer pump. (See Section 9.2: Pump Selection) For some types of pumps, it may be desirable to perform a volume check prior to injecting RegenOx™

- 13) Connect the delivery hose to the pump outlet and the delivery sub-assembly. Circulate RegenOx™ through the hose and the delivery sub-assembly to displace air in the hose. NOTE: an appropriately sized pressure gauge should be placed between the pump outlet and the delivery sub-assembly in order to monitor application pump pressure and detect changes in aquifer backpressures during application.
- 14) Connect the sub-assembly to the drive rod. After confirming that all of the connections are secure, pump the RegenOx™ through the delivery system to displace the water/fluid in the rods.
- 15) Slowly withdraw the drive rods. Commonly RegenOx™ injection progress at 1-foot intervals. However, continuous injection while slowly withdrawing single lengths of drive rod (3 or 4 feet) is an acceptable option. The pre-determined volume of RegenOx™ should be pumped into the aquifer across the desired treatment interval.
- 16) Remove one section of the drive rod. The drive rod may contain some residual RegenOx™. Place the RegenOx™-filled rod in a clean, empty bucket and allow the RegenOx to drain. Eventually, the RegenOx™ should be returned to the RegenOx™ pump hopper for reuse.
- 17) Monitor for any indications of aquifer refusal. This is typically indicated by a spike in pressure as indicated or (in the case of shallow applications) RegenOx™ “surfacing” around the injection rods or previously installed injection points. At times backpressure caused by reaction off-gassing will impede the pumps delivery volume. This can be corrected by bleeding the pressure off using a pressure relief/bypass valve (placed inline between the pump discharge and the delivery sub-assembly) and then resume pumping. If aquifer acceptance appears to be low, as indicated by high back pressure, allow sufficient time for the aquifer to equilibrate prior to removing the drive rod.



## REGENESIS

- 18) Repeat steps 13 through 23 until treatment of the entire contaminated vertical zone has been achieved. It is recommended that the procedure extend to the top of the capillary fringe/smear zone, or to the top of the targeted treatment interval.
- 19) Install an appropriate seal, such as bentonite, above the RegenOx™ material through the entire vadose zone. Prior to emplacing the borehole seal, we recommend placing clean sand in the hole to the top of the RegenOx™ treatment zone (especially important in holes that stay open). Bentonite chips or granular bentonite should be placed immediately above the treatment zone, followed by a cement/bentonite grout to roughly 0.5 feet below ground surface. Quick-set concrete should then be used as a surface seal.
- 20) Remove and clean the drive rods as necessary.
- 21) Finish the borehole at the surface as appropriate (concrete or asphalt cap, as needed). We recommend a quick set concrete to provide a good surface seal with minimal set up time.
- 22) A proper borehole and surface seal assures that the RegenOx™ remains properly placed and prevents contaminant migration from the subsurface. Each borehole should be sealed immediately following RegenOx™ application to minimize RegenOx™ surfacing during the injection process. If RegenOx™ continues to “surface” up the direct push borehole, an appropriately sized (oversized) disposable drive tip or wood plug/stake can be used to plug the hole until the aquifer pressures equilibrates and the RegenOx™ stops surfacing. If wells are used for RegenOx™ injection the RegenOx™ injection wells and all nearby groundwater monitoring wells should be tightly capped to reduce potential for surfacing through nearby wells.
- 23) Periodically compare the pre- and post-injection volumes of RegenOx™ in the holding tank or pump hopper using the pre-marked volume levels. Volume level may not be present on all tanks or pump hoppers. In this case, volume level markings can be temporarily added using known amounts of water and a carpenter’s grease pencil (Kiel crayon).
- 24) Move to the next probe point, repeating steps 8 through 29. We recommend that the next RegenOx™ injection point be as far a distance as possible within the treatment zone from the previous RegenOx™ injection point. This will further minimize RegenOx™ surfacing and short circuiting up an adjacent borehole. When possible, due to the high volumes of liquid being injected, working from the outside of the injection area towards the center will limit expansion of the plume.

## **Pump Selection**

Regenesis has evaluated a number of pumps and many are capable of delivering RegenOx™ to the subsurface at a sufficient pressure and volumetric rate. However, even though a number of the evaluated pumps may be capable of delivering the RegenOx™ to the subsurface based on adequate pressures and delivery rates, each pump has its own set of practical issues that may make it more or less difficult to manage in a field setting.

In general, Regenesis strongly recommends using a pump with a pressure rating of 200 pounds per square inch (psi) in sandy soil settings, and 800 psi in silt, clay or weathered bedrock settings. Any pump under consideration should have a minimum delivery rate of 5 gallons per minute (gpm). A lower gpm rated pump may be used; however, they are not recommended due to the amount of time required to inject the volume of liquids typically associated with a RegenOx™ injection (i.e. 1,000 lbs of RegenOx™ [500 lbs Oxidant/500 lbs Activator] require roughly 1,100 gallons of water to make a 5% Oxidant solution).

Quite often diaphragm pumps are used for the delivery of chemical oxidants. Generally, these pumps operate pressures from 50-150 psi. Some of these pumps do not have the pressure head necessary to overcome the back pressure encountered in silt and clay lenses. In these cases the chemical oxidant thus ends up being delivered to the surrounding sands (the path of least resistance) and is not delivered to soil with residual adsorbed contamination. The use of a positive displacement pump such as a piston pump or a progressing cavity pump is may be superior because these pumps have the pressure necessary to overcome the resistance of low permeability soils. NOTE: be aware that application at pressures that are too high may over-consolidate the soil and minimize the direct contact of the oxidant. The key is to inject at a rate and pressure that maximizes the radius of influence without causing preferential flow. This can be achieved by injecting at the minimum pressure necessary to overcome the particular pressures associated with your site soil conditions.

Whether direct injection or wells are used, it is best to start by injecting RegenOx™ outside the contaminated area and spiral laterally inwards toward the source. Similarly, RegenOx™ should be applied starting vertically at the bottom elevation of contamination, through the layer of contamination, and a couple of feet above the layer of contamination. The reagents can be pushed out from the well bore with some water.

## **Pump Cleaning**

For best results, flush all moving parts and hoses with clean water at the end of the day; flush the injection system with a mixture of water and biodegradable cleaner such as Simple Green.

**For more information or technical assistance please call Regenesis at 949-366-8000**



# **REGENESIS**

## **Oxygen Release Compound (ORC<sup>®</sup>)**

### **Installation Instructions**

(Excavation Applications)

#### **SAFETY:**

Pure ORC is shipped to you as a fine powder, which is rated at -325 mesh (passes through a 44 micron screen). It is considered to be a mild oxidizer and as such should be handled with care while in the field. Field personnel should take precautions while applying the pure ORC. Typically, the operator should work up wind of the product as well as use appropriate safety equipment. These would include eye, respiratory protection and gloves as deemed appropriate by exposure duration and field conditions.

Although two options are discussed, application of ORC should never be applied by personnel within the tank excavation, unless proper shoring or sidewall cutback is in place.

#### **GENERAL GUIDELINES:**

ORC can be applied in a dry powder form or as a slurry. Field conditions dictate which form of ORC can be used most effectively.

Installation of ORC should be within the tank excavation floor and/or in an adequate backfill section thickness to account for the anticipated groundwater "smear zone".

Maximum treatment effect is obtained when ORC is mixed as thoroughly as possible within the backfill material. The more dispersed the ORC slurry/powder within the excavation backfill, the more effective the treatment.

The quantity of ORC to be used is generally calculated prior to moving into the field for installation. Generally it is applied at a rate of between 0.1% and 1.0% by weight of the soil matrix. The following illustrates a dilute application rate calculation:

Use a weight/weight percent of ORC/backfill material to ensure distribution of the ORC into the desired aquifer section. For example: a 0.15% weight of ORC to weight of backfill for the standard ORC weight (30 pounds) per container calculates as follows:  $30 \text{ lb. ORC} / 0.15\% = 20,000 \text{ lbs. of soil matrix}$ . Thus, to achieve a 0.15% mixture of ORC in the backfill material, 30 lb. of pure ORC should be mixed into 10 tons (20,000 lbs. ÷ 2,000 lbs./ton) of backfill, or approximately 7 - 10 cubic yards of soil depending on field conditions. Professional judgment should be used to select the appropriate soil mass per cubic yard for designing each site treatment.

#### **CHOOSING THE FORM OF INSTALLATION:**

Pure ORC is shipped to you in a powder form. Weather conditions (especially wind) may have a direct effect on the application of ORC as a tank backfill amendment.

Application of the dry powder may be difficult in windy conditions. To counter the effects of wind (and the subsequent potential loss of ORC), Regenesi recommends that a water source or a spray tank be on-site to wet down the ORC and the backfill material as ORC is applied.

Application of ORC in a slurry format is a very effective method and eliminates the wind issue.

Four somewhat different installation conditions can be encountered in the field:

- ORC in a pea gravel back-fill. (“Type 1”)
- ORC in a soil back-fill. (“Type 2”)
- ORC mixed in native soil in the bottom of a tank pit. (“Type 3”)
- ORC installed in soil under standing water in the bottom of a tank pit. (“Type 4”)

A single tank pit excavation can include more than one of these conditions, depending on the site and extent of treatment. Instructions for each condition are discussed separately in the following sections. After the installation instructions are detailed instructions for mixing the slurry, if that is the option chosen.

## **INSTALLATION INSTRUCTIONS:**

### **“Type 1,” ORC in a Pea Gravel Back-fill**

The easiest method for installing ORC in pea gravel back-fill is to mix the ORC in the material in a backhoe or skiploader bucket before placing it in the excavation.

- **Dry Powder method**

Into each scoop of back-fill material add the appropriate portion of ORC being installed. Generally, it is advisable to moisten the material in the bucket to reduce wind blown ORC loss. Excessive winds make this method not feasible.

After mixing the dry powder in the bucket, it is dumped into the bottom of the excavation. The backhoe bucket can be used for further mixing in the excavation.

- **Slurry method**

Mix a 63% solids slurry of ORC and water (see “Steps to make ORC slurry”). This relatively thick slurry is used to help keep the ORC dispersed through the pea gravel, even when it contacts water in the bottom of the excavation during installation. It is generally desirable to avoid having the ORC run down through the pea gravel and collect in the bottom of the excavation. The thick slurry addresses this issue.

In each scoop of back-fill material, add the appropriate amount of ORC slurry. Pre-mix the materials in the backhoe bucket. After mixing, dump the slurry and back-fill into the bottom of the excavation. The backhoe bucket can be used for further mixing in the

excavation.

If the slurry method is being used, observe the physical behavior of the ORC in the fill material. If the ORC collects at the bottom of the back-fill material, increase the percent solids content by reducing the amount of water being used to make the slurry.

### **“Type 2,” ORC in a Soil Back-fill**

Follow the instructions for the pea gravel back-fill method, except:

If the slurry method is being used, the solids content should be reduced. Typically a 50% solids is appropriate, although soil conditions sometimes dictate lower solids contents (see “Steps to make ORC slurry”).

### **“ Type 3,” ORC Mixed in Native Soil in the Bottom of the Tank Pit**

When ORC is added to the bottom of a tank pit it may be done by backhoe or injection.

CAUTION: Personnel should never work within the tank excavation, unless proper shoring or sidewall cutback is in place.

- **Backhoe method**

A skilled backhoe operator can distribute the ORC around the bottom of the tank excavation and, using the bucket, mix it thoroughly. If there are no winds, it may be possible to:

1. Put the dry ORC powder in the backhoe bucket,
2. Lower it to the bottom of the pit,
3. Gently deposit the ORC evenly on the remaining soil,
4. Use the bucket to mix the powder into the soil,
5. To mitigate dusting, if necessary, spray water into the excavation during the process.

An alternative backhoe method is to use a 50% (or less) solids ORC slurry (see “Steps to make ORC slurry) in place of the dry powder. This eliminates the dusting problem, and in some cases enhances the even distribution of ORC into the soil. Observe the slurry mixing behavior in the bottom of the excavation, and adjust the water content of the slurry to optimize mixing, if necessary.

- **Injection method**

If available, a pump and root feeder may be used to inject an ORC slurry into the excavation floor. This may require a more dilute slurry mix, and care should be taken to assure that the solids do not settle out of the slurry prior to injection.

### **“ Type 4.” ORC installed in standing water in the bottom of a tank pit**

Application of ORC into tank excavations with standing water requires the operator apply ORC in a slurry form. ORC powder application in this scenario is not advised because a portion of the ORC particle fraction is not likely to pass through the surface tension of the standing water. Caution: Personnel should never work within the tank excavation, unless proper shoring or sidewall cutback is in place.

- **Backhoe method**

A skilled backhoe operator can distribute the ORC slurry within the excavation, and mix it into the soil underlying the standing water with the bucket. Steps for installation:

1. Mix a high solids content ORC slurry (63% solids). See (“Steps to make ORC slurry”).
2. Pour slurry into the backhoe bucket.
3. Lower the bucket to the standing water level in the excavation, and deposit the slurry as evenly as possible across the excavation floor. The dense slurry (63%solids is 1.6 grams per ml) will tend to make the majority of the slurry sink quickly to the bottom of the water layer.
4. Use the bucket to mix the slurry into the soil.
5. Water in the vicinity of the ORC slurry will often turn white and milky, since some of the ORC is dispersed within the standing water. This provides additional dispersion within the standing water and back-fill material as it is added to the excavation.

- **Injection method**

If available, a pump and root feeder may be used to inject an ORC slurry into the soil in an excavation. This may require a more dilute slurry mix, and care should be taken to assure that the solids do not settle out of the slurry prior to injection.

**MIXING ORC SLURRY:**

ORC powder is shipped to you in pre-measured batches. Each batch is contained in a plastic bag which is shipped in a 5-gallon bucket.

Remove the pre-measured ORC bag from the 5-gallon bucket and open  
 Measure and pour the appropriate amount of water from the following table into the 5 gallon bucket

Slurry Solids Content (%)	Pounds of ORC	Gallons of Water
63%	30 lbs.	2.1 gal. (2 gal. + 2 cups)
50%	30 lbs.	3.6 gal. (3 gal + 2 1/2 qts.)

Add the entire ORC pre-measured bag to the water (30 pounds). If the slurry solids contents of less than 50% are desired, the quantity of ORC per batch mixed in the bucket must be reduced. For example, a bucket containing four gallons of water would require 22.4 pounds of ORC to make a 40% solids slurry, and 16.6 pounds of ORC to make a 33% slurry.

Use an appropriate mixing device to thoroughly mix ORC and water. Regenesis

recommends use of a 0.5 Horsepower (minimum) hand held drill with a “jiffy mixer” or stucco mixer. A common paint paddle can be used to scrape the bottom and sides of the container to ensure thorough mixing. Standard environmental slurry mixers may also be used.

After mixing, small amounts of water can be added to adjust the consistency of the slurry.

When slurries are used, the early batches should be observed in the process of mixing with the soil. Each site can vary, due to soil type and moisture content. Based on professional judgment, additional water can be added to subsequent slurry batches.

ORC slurry should be used ASAP; if the ORC slurry has been standing more than 15 minutes, it should be remixed immediately before using. Do not let stand more than 30 minutes without stirring. Otherwise, the slurry will begin to harden into a weak cement.

**For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesi s Technical Services at 949-366-8000.**

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# **REGENESIS**

## **Oxygen Release Compound (ORC<sup>®</sup>)**

### **Installation Instructions**

**(Direct-Injection Slurry Application)**

#### **SAFETY:**

Pure ORC is shipped to you as a fine powder rated at -325 mesh (passes through a 44 micron screen). It is considered to be a mild oxidizer and as such should be handled with care while in the field. Field personnel should take precautions while applying the pure ORC. Typically, the operator should work upwind of the product as well as use appropriate safety equipment. These would include eye and respiratory protection, and gloves as deemed appropriate by exposure duration and field conditions.

Personnel operating the field equipment utilized during the installation process should have appropriate training, supervision and experience.

#### **GENERAL GUIDELINES:**

ORC may be installed in the contaminated saturated zone in the ground utilizing hand augered holes, Geoprobe<sup>®</sup> type hydraulic punch equipment, or hollow stem augers. This set of instructions is specific for Geoprobe equipment. Alternate instructions may be obtained from the RegenesiS Technical Support Department.

For optimum results the ORC slurry installation should span the entire vertical contaminated saturated thickness, including the capillary fringe and “smear zone”.

Two general installation approaches are available. The first is to backfill only the probe hole with slurry. This is a simple approach, in that it is easy, straightforward, and the location of the ORC slurry is precisely known after installation. However, this method requires significantly more probe holes than the alternative, and may take more time for the completion of the remediation process. A separate set of instructions for this method utilizing Geoprobe equipment is available from RegenesiS.

The second method is to inject the slurry through the probe holes into the contaminated saturated zone. This method requires fewer probe holes, is less disruptive to the site, and aids the spread of oxygen by spreading the ORC source material. However, it may be difficult to know the exact, final disposition of the ORC installed with this method. This is the method described in these instructions.

Note: It is important that the installation method and specific ORC slurry point location be established prior to field installation. It is also important that the ORC slurry volume and solids content for each drive point be predetermined. The RegenesiS Technical Service Department is available to discuss these issues, and Helpful Hints at the end of these instructions offers relevant information. RegenesiS also has available Technical Bulletins covering source treatments with ORC.

## SPECIFIC INSTALLATION PROCEDURES

1. Identify the location of all underground structures, including utilities, tanks, distribution piping, sewers, drains, and landscape irrigation systems.
2. Identify surface and aerial impediments.
3. Adjust planned installation locations for all impediments and obstacles.
4. Pre-mark the installation grid point locations, noting any that have special depth requirements.
5. Set up the Geoprobe unit over each specific point, following manufacturer recommended procedures. Care should be taken to assure approximate vertical probe holes.
6. Penetrate surface pavement, if necessary, following standard Geoprobe procedures.
7. Drive the 1 1/2" (one-and-one-half inch) pre-probe (part #AT-148B) with the expendable tip (part #AT142B) to the desired maximum depth. Standard 1" (one inch) drive rods (part AT104B) should be used, after the pre-probe. (Hint: Pre-counted drive rods should be positioned prior to the installation driving procedure to assure the desired depth is reached.)
8. Disconnect the drive rods from the expendable tip, following standard Geoprobe procedures.
9. Mix the appropriate quantity of ORC slurry for the current drive point. (See separate "Directions for ORC<sup>®</sup> Slurry Mixing" and Helpful Hints). **Note: Do not mix more slurry than will be used within a 30 minute period.**
10. Set up and operate an appropriate slurry pump according to manufacturer's directions. Based on our experience, a Geoprobe model GS-1000 pump is recommended. Connect the pump to the probe grout pull cap (GS-1054) via a 1 inch diameter delivery hose. The hose is then attached to the 1" drive rod with its quick connector fitting. Upon confirmation of all connections add the ORC slurry to the pump hopper/tank.
11. Withdraw the pre-probe and drive stem 4' (four feet). (Also note Helpful Hints - Operations at end of instructions.)
12. Optional pretreatment step. (See Helpful Hints - Operations at end of instructions). Pump one to two gallons of tap water into the aquifer to enhance dispersion pathways from the probe hole.
13. Pump the predetermined quantity of ORC slurry for the depth interval being injected. Observe pump pressure levels for indications of slurry dispersion or refusal into the aquifer. (Increasing pressure indicates reduced acceptance of material by the aquifer).
14. Remove one 4' section of the 1" drive rod. The drive rod will contain slurry. This slurry should be returned to the ORC bucket for reuse.
15. Repeat steps 11, 13, and 14 until treatment of the entire affected thickness has been achieved. It is generally recommended that the procedure extend to the top of the capillary fringe/smear zone.
16. Install an appropriate seal, such as bentonite, above the ORC slurry through the entire vadose zone. This helps assure that the slurry stays in place and prevents contaminant migration from the surface. Depending on soil conditions and local regulations, a bentonite seal can be pumped through the slurry pump or added via chips or pellets after probe removal.
17. Remove and decontaminate the drive rods and pre-probe.

18. Finish the probe hole at surface as appropriate (concrete or asphalt cap, if necessary).
19. Move to the next probe point, repeating steps 5 through 18.

**HELPFUL HINTS:**

A. Physical characteristics

A1. Slurry

The ORC slurry is made using the dry ORC powder (rated at -325 mesh). It makes a smooth slurry, with a consistency that depends on the amount of water used.

A thick, but pumpable, slurry that approaches a paste can be made by using 65-67% solids. This material would normally be used for back-filling a bore or probe hole. It is especially useful where maximum density is desired such as where ground water is present in the hole or there are heaving sands.

Thinner slurries can be made by using more water. Typical solids for the thinner slurries content will range from 35% to 62%. Such slurries are useful for injecting through a probe or bore hole into the saturated aquifer.

As a rule, it is best to mix the first batch of slurry at the maximum solids content one would expect to use. It can then be thinned by adding additional water in small increments. By monitoring this process, the appropriate quantities of water for subsequent batches can be determined.

The slurry should be mixed at about the time it is expected to be used. It is best to not hold it for more than 30 minutes. Thinner slurries, especially, can experience a separation upon standing. All ORC slurries have a tendency to form cements when left standing. If a slurry begins to thicken too much, it should be mixed again and additional water added if necessary.

Care should be taken with slurry that may be left standing in a grout pump or hose. Problems can generally be avoided by periodically re-circulating the slurry through the pump and hose back into the pump's mixing or holding tank.

A2. Equipment

Most geotechnical grout pumping equipment has a holding tank with a capacity sufficient for injection.

When applying measured volumes of ORC slurry to probe holes, it is sometimes useful to know the volumes and content of the delivery system lines. The following information may be useful in this regard.

Geoprobe pump: At the end of a pump stroke virtually no deliverable slurry remains in the pump.

5/8" O.D. connecting hose (10 feet long):	0.2 gallons (26 fluid ounces).
Four foot (4') length of 1" drive rod:	.04 gallons (5 fluid ounces).
Three foot (3') length of 1 1/2" pre-probe:	.03 gallons (4 fluid ounces).

## Cleaning and maintenance:

Pumping equipment and drive rods can be lightly cleaned by circulating clear water through them. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

### B. Operating characteristics

#### B1. Operations - General

Judgment will be needed in the field when injecting ORC slurries. In general, it is relatively easy to inject ORC slurries into sandy soils, and this can usually be accomplished at very moderate pressures. Silts and clays require more pressure, and may accept less slurry.

Careful observation of pressure during slurry pumping is the best indication of the effectiveness of the slurry injection. To test the soil's ability to accept the slurry and to "precondition" the injection point for the slurry, it is sometimes useful to inject a small volume of plain water prior to the slurry. Normally, one-half (0.5) gallons to two (2) gallons would be appropriate.

During injection, increasing pressure and decreasing flow rate are signs of refusal by the soil matrix to accept the slurry. The site geologist should determine whether to increase pressure, and possibly fracture ("frac") the soil matrix to achieve ORC slurry installation in a tight site that has refused the slurry at lower pressures.

#### B2. Fill Volumes

Probe hole back-filling

Probe hole capacities:

Per 10' (Ten Foot) Length			
Theoretical		Operating Volume	
(Gallons/Fluid Ounces/Cubic Inches)		(Gallons/Fluid Ounces)	
Sand, Silts & Clay		Sand	Silts & Clay
1" Diameter	.41 gal/52 fl. oz./94.2 cu. in.	.61 gal/78 fl. oz.	.51 gal/65 fl. oz.
1 1/2" Diameter	.92 gal/117 fl. oz./212.0 cu. in.	1.38 gal/176 fl. oz.	1.15 gal/146 fl. oz.
2" Diameter	1.63 gal/209 fl. oz./376.8 cu. in.	2.44 gal/313 fl. oz.	2.04 gal/261 fl. oz.
2 1/4" Diameter	2.06 gal/264 fl. oz./476.9 cu. in.	3.09 gal/396 fl. oz.	2.57 gal/330 fl. oz.

Note that the operating volumes include a 50% excess above the theoretical volume in sands and 25% in clays and silts. This is important to successful treatment. The additional material allows for a small degree of infiltration of the slurry into the surrounding soil and fractures, as well as hole diameter variability. It is important to assure that the entire contaminated saturated zone is treated (including the capillary fringe), since this is often the area of highest pollution concentration. Failure to treat this area due to improper installation can undermine an otherwise successful remediation effort.

**For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesis Technical Services at 949-366-8000.**

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# REGENESIS Oxygen Release Compound ADVANCED™

## High Benzene Concentrations Reduced Using ORC Advanced – Sheboygan, WI

### SITE SUMMARY

Elevated levels of petroleum hydrocarbons were discovered near the former dispenser island at a former service station in Sheboygan, WI. In hopes of reducing concentrations, soil excavation activities took place in June 2003. A total of 500 tons of hydrocarbon-impacted soils were removed and transported to a landfill for disposal. However, residual contamination continued to affect the groundwater after the excavation. By March 2004, benzene and ethylbenzene had risen to 2,500 ug/L and 1,300 ug/L, respectively. In situ bioremediation using ORC Advanced was chosen to reduce BTEX, naphthalene, and trimethylbenzenes. In the northwest corner of the site, the location of the former UST basin, a total of 480 pounds of ORC Advanced was injected. In the southeast corner, the area of highest contamination, a total of 2,370 pounds of ORC Advanced was injected.

### REMEDIATION APPROACH

- **Remediation Objective:** Reduce concentrations of Benzene to cleanup goals at the entire site. See Table 1.
- **Application Type:** Grid
- **Product:** ORC Advanced
- **Quantity Applied:** 2,850 lbs
- **Application Rate:** NW Corner-4 lbs/ft; SE Corner-11.9 lbs/ft
- **Injection Spacing:** 10 ft
- **Product Cost:** \$24,225

**Table 1. Cleanup Goals**

Contaminant	Concentration
Benzene	5 ug/L
Toluene	1,000 ug/L
Ethylbenzene	700 ug/L
Xylenes	10,000 ug/L

### SITE CHARACTERISTICS

#### General

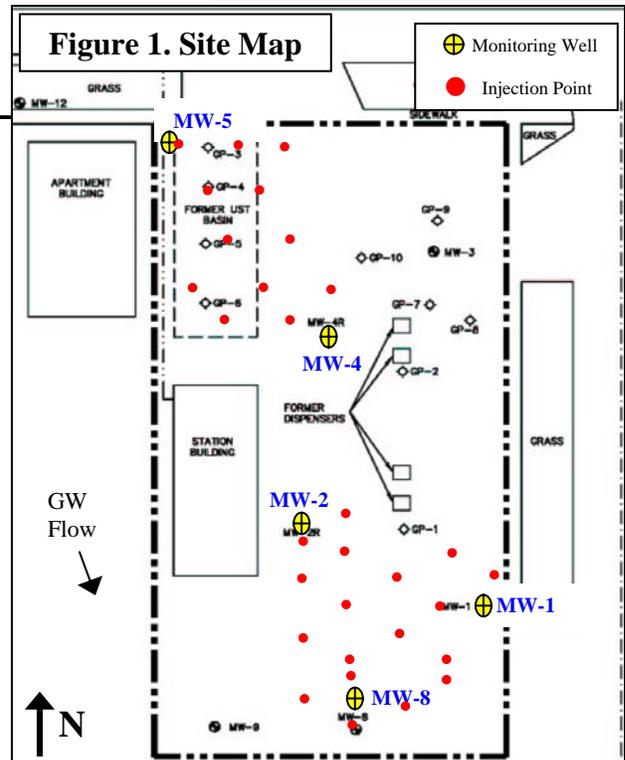
- **Name:** Former Marathon Unit #3697
- **Location:** Sheboygan, WI
- **Industry:** Service Station
- **Contaminants of Concern:**

**Table 2. Well MW-8 Concentrations**

Contaminant	Concentration
Benzene	1,700 ug/L
Toluene	530 ug/L
Ethylbenzene	1,300 ug/L
Xylenes	3,190 ug/L

#### Hydrogeology

- **Treatment Area:** NW Corner 1,200 ft<sup>2</sup>  
SE Corner 1,800 ft<sup>2</sup>
- **Soil Type:** Silty sand lenses in clay matrix
- **Groundwater Flow Direction:** Southeast
- **Depth to Groundwater:** 12-15 ft



## RESULTS

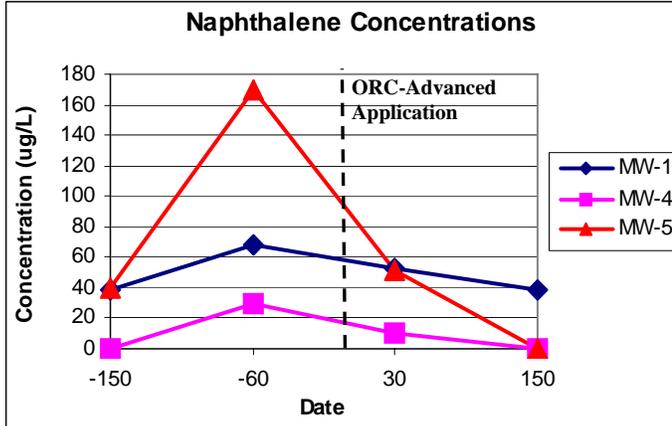
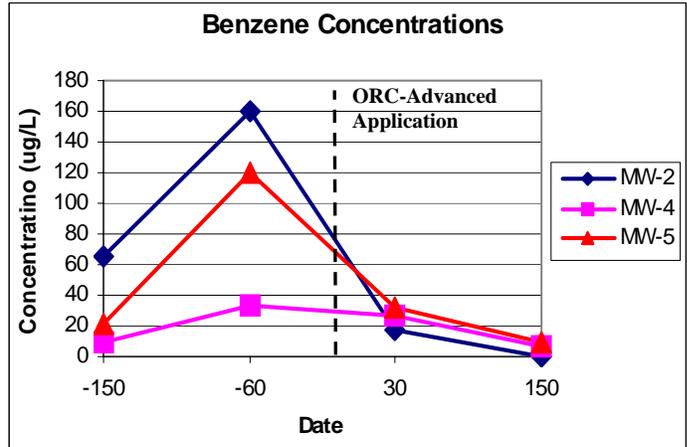
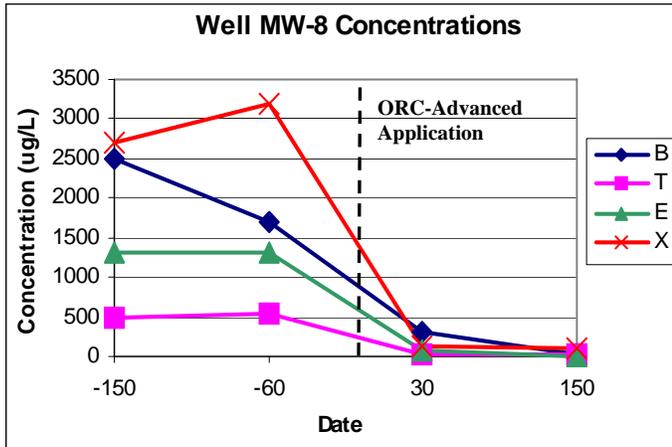
### Percent Contaminant Reduction

Contaminant	Percent Reduction
Benzene	98%
Toluene	96%
Ethylbenzene	99%
Xylenes	96%

### Post Treatment Concentrations

Contaminant	Concentration
Benzene	30 ug/L
Toluene	18 ug/L
Ethylbenzene	5.8 ug/L
Xylenes	115 ug/L

### Concentrations vs. Time



Note: The significant decrease seen from day -60 is indicative of the gap between data points as concentrations most likely stayed their course, increasing, until ORC Advanced was injected and a new data point collected at day 30.

## CONCLUSION

Groundwater sampling results after excavation activities show an increasing trend of contamination. On average, concentrations continued to increase up until the ORC Advanced application due to residual contamination. Concentrations peaked before ORC Advanced injection followed by a significant reduction across the plume. In well MW-5, benzene spiked to 160 ug/L while naphthalene rose to 170 ug/L and in well MW-4 BTEX, naphthalene and trimethylbenzenes all increased. Significant decreases of all contaminants were seen shortly after ORC Advanced injection. In well MW-8 total BTEX was reduced from 6,720 ug/L to 168.8 ug/L, a 97% reduction. Naphthalene concentrations were above the MCL of 20 ug/L in wells MW-1, MW-4, MW-5. ORC Advanced reduced concentrations to non-detect in wells MW-4 and MW-5, leaving 38 ug/L in well MW-1. Monitoring is on-going as concentrations continue to decrease towards MCLs.

## CONTACTS

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Handex of Indiana

**Regenesis:** Scott Mullin  
Central U.S. Regional Manager  
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smullin@regenesis.com

# Enhanced Bioremediation using Controlled-Release Oxygen Facilitates Site Closure at DoD Site

Dave Marks (Insight EE&C, Inc., Sacramento, CA, USA) and Jack Peabody (Regenesis, Pleasant Hill, CA, USA)



## SITE BACKGROUND

Hill Air Force Base houses the former Defense Distribution Depot located in Ogden, Utah. The Depot was closed in September 1997 and building #321 was formerly used as a gasoline re-fueling station. Originally, the site contained four aboveground storage tanks, one underground storage tank (UST), one aboveground propane tank, one fuel dispenser island, and two attendant buildings. Based on previous environmental site investigation work, soil and groundwater were determined to have been impacted with petroleum-based fuel hydrocarbons, resulting from the former operation of the fueling system at the site. Total petroleum hydrocarbons as gasoline (TPHg) had reached more than 1,000 micrograms per liter (ug/L) on-site while benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations were more than 100 ug/L.

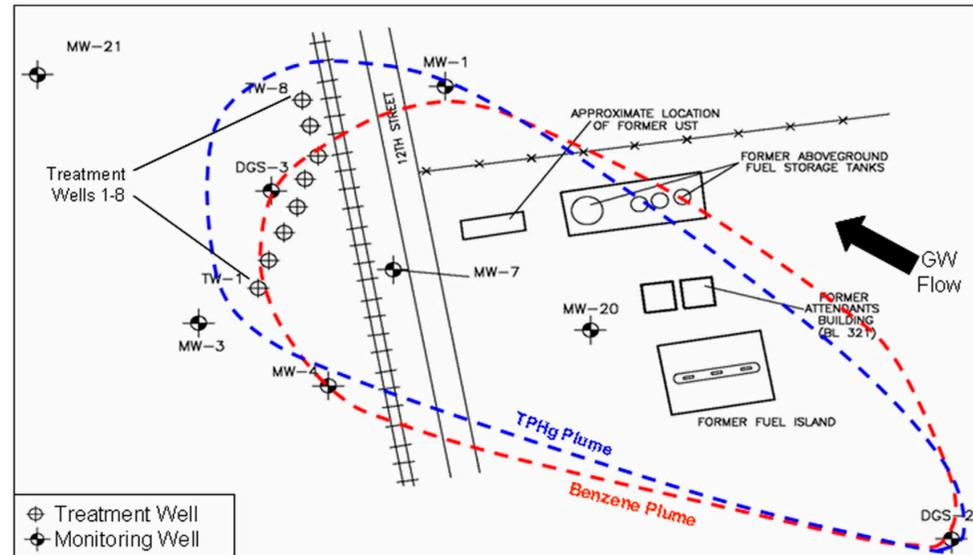


Figure 1. Isoconcentrations of Benzene Plume and TPHg Plume

The State of Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (DERR) required that corrective action be conducted to reduce contaminant concentrations to less than the Risk-Based Corrective Action (RBCA) Tier 1 levels. The corrective actions at the site included the removal of all aboveground structures and underground petroleum pipelines, the excavation and removal of approximately 1,120 yd<sup>3</sup> of contaminated soil, the installation of groundwater monitoring wells at various locations across the site, the installation of a row of groundwater treatment wells near the leading edge of the known groundwater plume, and the injection of Oxygen Release Compound (ORC®) to enhance biodegradation of residual hydrocarbons.

## TREATMENT APPROACH

The former UST area (source) was excavated down to the top of the water table (~10 feet bgs). The top 2 feet of clean backfill (8-10 feet bgs) material was blended with granular ORC and placed in the excavation for treatment of the vadose zone.

To reduce petroleum hydrocarbons within the sand and clay subsurface, an ORC Filter Sock program was implemented. In Treatment Wells 1-8 (Figure 1), ORC Filter Socks (Figure 2) were installed from approximately 10 feet below ground surface (bgs) to 20 feet bgs using rope (Figure 3). A sampling program was structured to observe concentration reduction.



Figure 2. ORC and ORC Advanced Filter Socks - 2", 4", and 6"

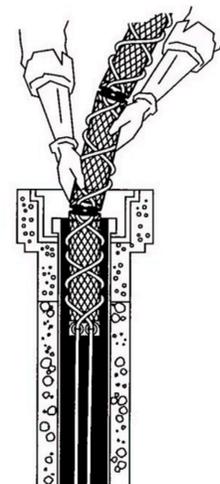
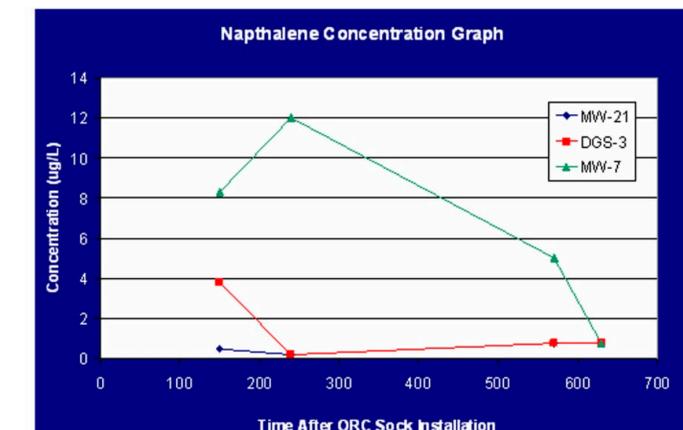
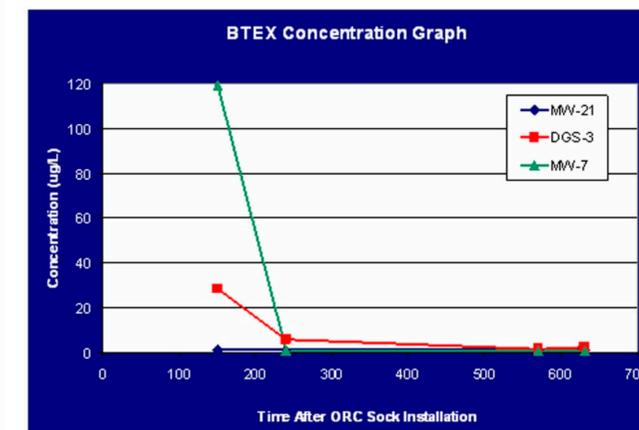
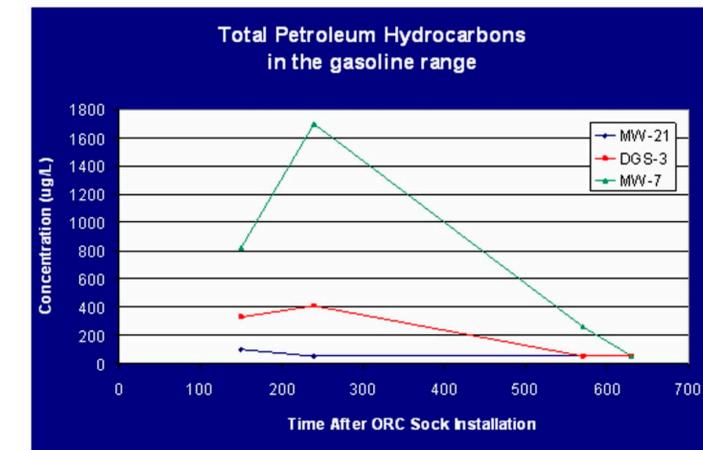


Figure 3. ORC Sock Installation

## RESULTS

- A high in TPHg, BTEX, and naphthalene was observed in well MW-7 followed by a significant reduction.
- In MW-7, TPHg concentrations declined from 1,700 to 53 ug/L within 8 months, a 97% reduction.
- A BTEX reduction to below 2 ug/L was observed in MW-7, DGS-3, and MW-21.
- Naphthalene concentrations declined to below 1 ug/L in all wells.



### Successful Reduction using ORC

Four groundwater monitoring events were performed to evaluate the quality of groundwater beneath the site with respect to petroleum hydrocarbon contamination and to assess the effectiveness of the ORC Filter Socks. The results of the sampling revealed that TPHg, BTEX, and naphthalene were non-detect or measured at concentrations below the screening levels established by the State of Utah DERR.

### No Further Action

Since the conditions of the DERR corrective action plan were met, in November of 2000, Insight, EE&C, Inc. requested that no further action status be granted and that the site be closed.

## Combined Application of RegenOx™ and ORC Advanced® Reduces Benzene to Below Cleanup Goals

### CASE SUMMARY

#### Service Station, Clanton, AL

Petroleum hydrocarbon contamination was discovered during the excavation of leaking underground storage tanks. Subsurface investigations revealed that a plume of benzene, toluene, ethylbenzene and xylenes (BTEX) was present downgradient of the excavation. Sampling from Well MW-2 confirmed that the benzene concentration exceeded the regulatory limit within groundwater. To reduce the contaminant mass, a combined approach using chemical oxidation via RegenOx™ and enhanced aerobic bioremediation via ORC Advanced® was implemented. Two applications of RegenOx and ORC Advanced were completed using direct-push technology within the source area and downgradient. RegenOx was first applied in January 2006, followed by ORC Advanced in late February 2006. A second RegenOx and ORC Advanced application was completed approximately 8 months later to mitigate the risk of re-contamination and treat a small amount of weathered free product observed during the first application.

### REMEDIATION APPROACH

The objective was to reduce benzene concentrations in groundwater to below the cleanup level mandated by the regulatory agency. Direct-push technology was used to apply RegenOx and ORC Advanced to the subsurface in a grid pattern surrounding Well MW-2 (Figure 1).

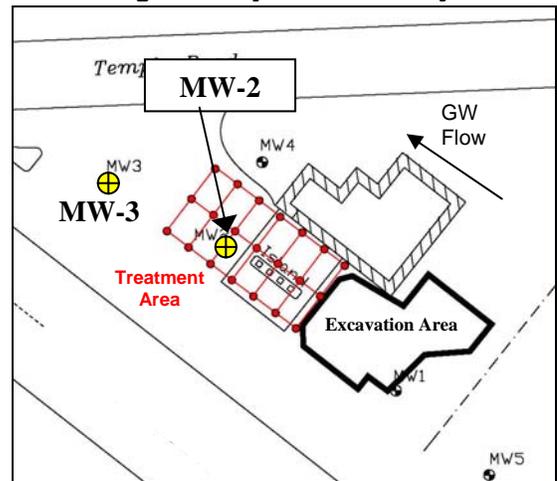
**Table 1. Contaminant Concentrations in Well MW-2 and the Benzene Cleanup Goal (ppm)**

Contaminant	Concentration	Cleanup Goal
Benzene	2.4	0.99
BTEX	17.5	NA

**Table 2. Application Details**

	RegenOx	ORC Advanced
Treatment Thickness	12 feet	12 feet
Injection Spacing	8 ft	8 - 10 ft
Quantity Applied	5,060 lbs	1,200 lbs
Product Cost	\$9,068	\$10,500

Figure 1. Injection Grid Layout



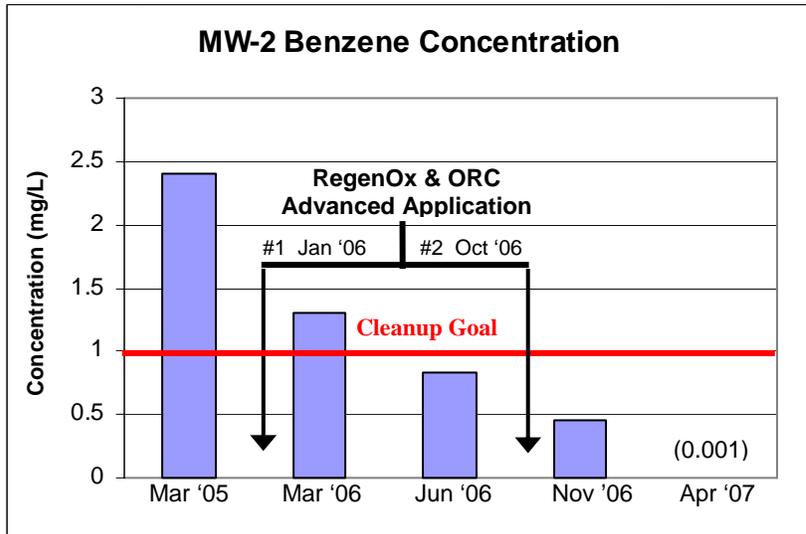
- **Application Type:** Grid Application
- **Treatment Area:** 1,800 ft<sup>2</sup>
- **Treatment Thickness:** 13 ft
- **Soil Type:** Silty Sand
- **Depth to Groundwater:** 5 ft
- **Groundwater Velocity:** 34 ft/yr

**RESULTS**

The benzene concentration in Well MW-2 was reduced to the cleanup goal within approximately 6 months of the initial RegenOx/ORC Advanced application (Graph 1). Total BTEX concentration was reduced from 17.5 to 0.588 ppm by November 2006. Reductions were also observed in downgradient Well MW-3 as BTEX decreased from 0.22 to 0.042 ppm.

**Graph 1. Benzene Reduction below the Cleanup Goal**

<b>January 2006</b>	<b>Feb/March 2006</b>
RegenOx	ORC Advanced
2,500 lbs	700 lbs
<b>October 2006</b>	
RegenOx	ORC Advanced
2,560 lbs	500 lbs



**Table 3. Summary of RegenOx and ORC Advanced Treatment in Well MW-2**

Contaminant	Pre-Treatment Concentration (ppm)	Post-Treatment Concentration (ppm)	Cleanup Goal	Percent Reduction
Benzene	2.4	0.001	0.99	99%
BTEX	17.5	0.004	NA	99%

**CONCLUSION**

The combined approach of chemical oxidation and enhanced aerobic bioremediation using RegenOx and ORC Advanced successfully reduced the high concentrations of petroleum hydrocarbons and treated the benzene contamination in groundwater to below the cleanup goal. The benzene concentration remained below the cleanup goal for two subsequent monitoring events spaced approximately 5 months apart. A No Further Action letter was awarded in January 2008. The site is currently being prepared for redevelopment.

**CONTACT**

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## RegenOx Treats #2 Fuel Oil Plume Beneath Residential Home

### CASE SUMMARY

#### Home Heating Oil, New Jersey

A 550-gallon leaking underground storage tank (UST) containing #2 fuel oil was removed from a single family residence in New Jersey (Figure 1). In addition, the surrounding soil was excavated and sampling was performed to determine the extent of the petroleum hydrocarbon plume within soil and groundwater. The plume was delineated at approximately 1,800 ft<sup>2</sup> with concentrations of total petroleum hydrocarbons as high as 40,000 parts per million (ppm) in soil and approximately 40,000 parts per billion (ppb) in groundwater. An estimated 20% of the plume was determined to be located beneath the home itself, eliminating the option for extensive soil excavation. Other remedial strategies such as pump & treat, monitored natural attenuation, and enhanced fluid recovery were ruled out as they did not provide a timely, cost-effective solution.



Figure 1. Residential Site

Table 1. Contaminant Concentrations	
Contaminant	Concentration
TPH - soil	40,000 ppm
TVOC - gw	7,900 ppb
TSVOC - gw	40,000 ppb

- **Soil Type:** Fine to Medium Sands
- **Treatment Thickness:** 5 to 12 feet bgs
- **Free Product:** 1" to 3" observed
- **Contaminants of Concern:**
  - TPH – Total Petroleum Hydrocarbons
  - TVOC – Total Volatile Organic Carbon
  - TSVOC – Total Semi-Volatile Organic Carbon

### REMEDIATION TECHNOLOGY

In-situ chemical oxidation (ISCO) using RegenOx™ was chosen as the most appropriate technology to treat the soil and groundwater plume. In addition, an application of a slow-release oxygen compound, ORC Advanced®, was applied following RegenOx to stimulate aerobic biodegradation of any residual contaminants. RegenOx was applied based on the following –

- Least disruptive to the homeowner
- Successful track record
- Feasible site conditions – sandy soils and a shallow water table paired well with direct-push injection
- Low natural organic carbon in saturated zone
- Safe to use and easy to apply



Figure 2. Crawl Space Injection Point

Ten permanent injection points were installed around the source area, at the edge of the plume and beneath the house in the crawl space as seen in Figure 2. During the installation, free phase product was observed in monitoring wells at approximately 1 to 3 inches. The NJDEP's Permit-by-Rule prohibited the injection of any remediation technology should free product be present. Once the removal was complete, RegenOx could be applied as designed.



## CONTAMINANT PLUME TREATMENT

### Free Product Removal

The free product was removed using a mild surfactant and a high powered vacuum extraction truck within the source area. This process also effectively distributed the surfactant across the impacted zone for further desorption of contaminants from the soil matrix. Three free product recovery events were performed which effectively removed all free product from the wells and surrounding areas. TVOC concentrations in groundwater dropped only slightly as a result of the free product removal. However, concentrations of TSVOCs more than doubled in groundwater as a result of desorption from soil.

### ISCO Injection for TPH Reduction

The application design included two RegenOx injection events and a third combined RegenOx and ORC Advanced injection for on-going biostimulation to treat residual contaminants. Using temporary and permanent injection points, a total of 6,210 pounds of RegenOx was applied from 5 to 11 feet bgs. The third injection included 650 pounds of ORC Advanced.



Figure 3. Specially Designed Injection System Applied Six Points Simultaneously



Figure 4. Permanent Injection Points

## CONCLUSION

No free product, sheen or film was observed after the injections were completed (Figure 5). Levels of dissolved oxygen 30 days following the final application were measured at approximately 10-20 ppm indicating the presence of ORC Advanced in the subsurface.

Within 6 months, significant reductions in petroleum hydrocarbons were observed. TVOCs declined from 7,900 to <50 ppb and TSVOCs were reduced from 40,000 to <150 ppb. The site is currently seeking No Further Action status from the NJDEP.



Figure 5. Pre and Post Groundwater Samples

## CONTACT

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