



October 3, 2013

New York City Office of Environmental Remediation
City Voluntary Cleanup Program
c/o Shaminder Chawla
100 Gold Street, 2nd 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 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.
2. 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.
3. 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.

4. 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.
5. 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.
6. 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>.
7. 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].
8. **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.
9. 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**.

10. 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**.
11. 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.
12. 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**.
13. Truck route is included in **Appendix 9**.
14. Dewatering will be performed in full compliance with applicable laws, rules and regulations.
15. Development plans are attached in **Appendix 10**.
16. CHASP attached in **Appendix 11**.

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



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

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:

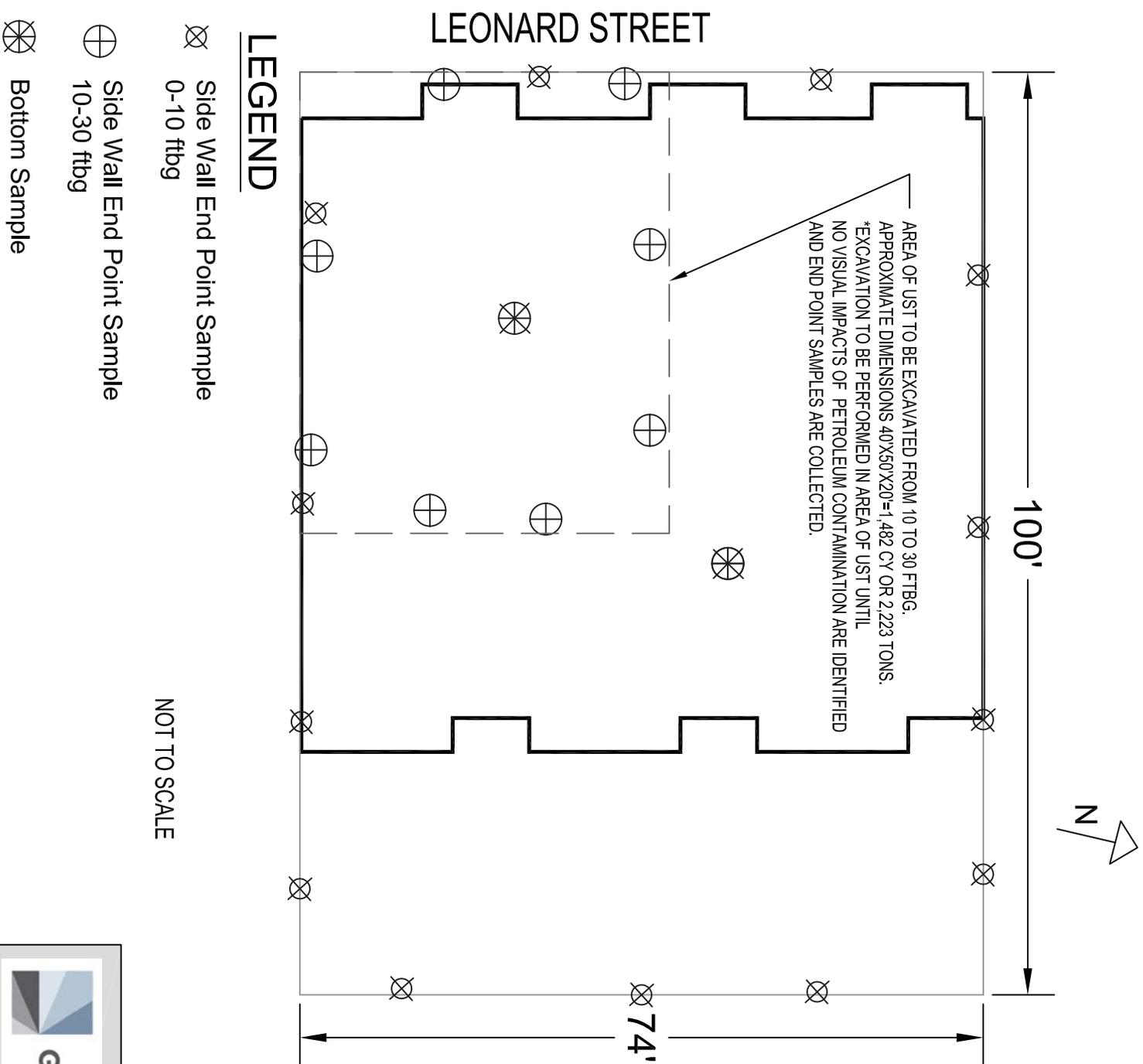
1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff;
2. For excavations 20 to 300 feet in perimeter:
 - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall 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. 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



PH: (800) 635-3456 - www.rufco.com - FAX: (605) 331-0333
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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™ 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 ²
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 ² ·hr·in·Hg)	0.0064 Perms g/(24hr·m ² ·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 ²	0.0028 gm/hr-m ²
RADON DIFFUSION COEFFICIENT	K124/02/95	< 1.1 x 10 ⁻¹³ m ² /s	
METHANE PERMEANCE	ASTM D 1434	< 1.7 x 10 ⁻¹⁰ m ² /d·atm 0.32 GTR (Gas Transmission Rate) ml/m ² ·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



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



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Email: efdsales@ravenind.com
www.ravenefd.com
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:

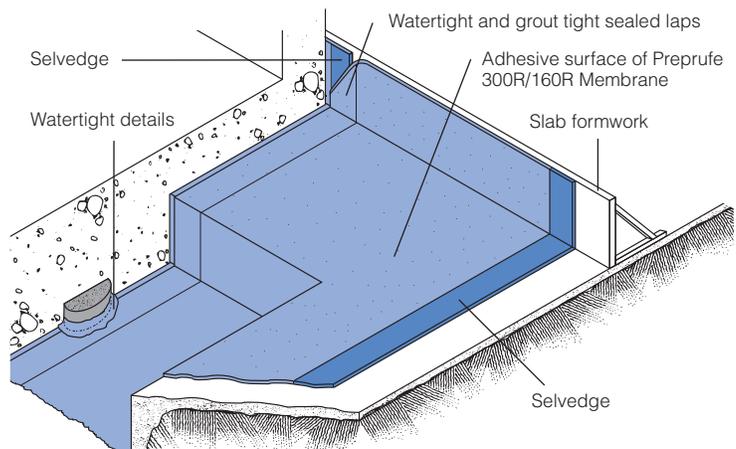
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe 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 for specific application details.

Installation

The most current application instructions, detail drawings and technical letters can be viewed at 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. 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/mm²) 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.

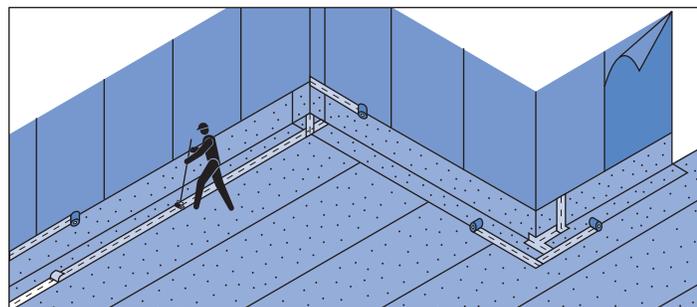
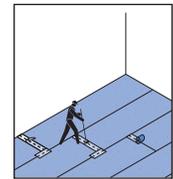
Figure 1



Figure 2



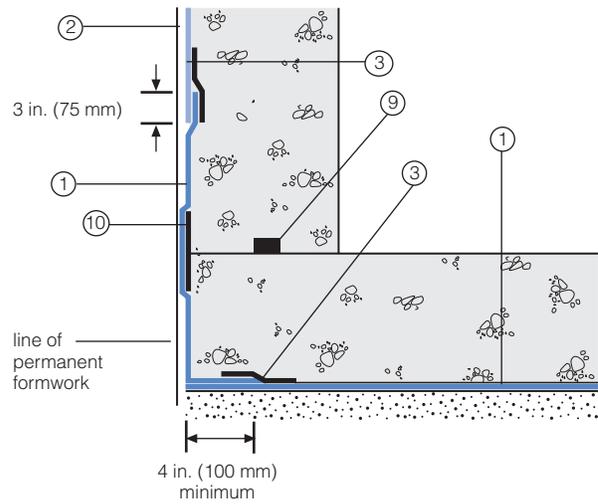
Figure 3



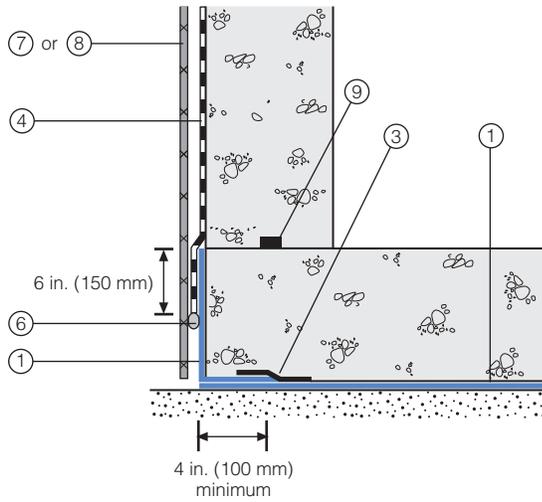
Detail Drawings

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

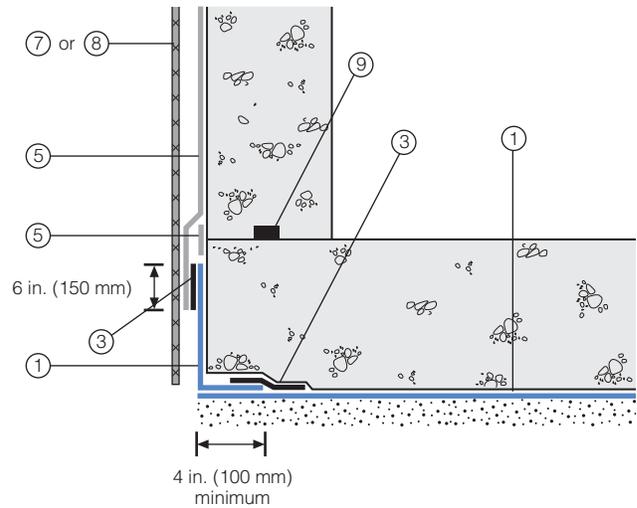
Wall base detail against permanent shutter



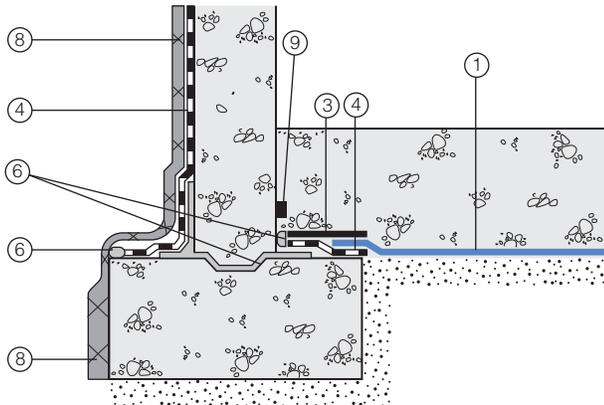
Bituthene wall base detail (Option 1)



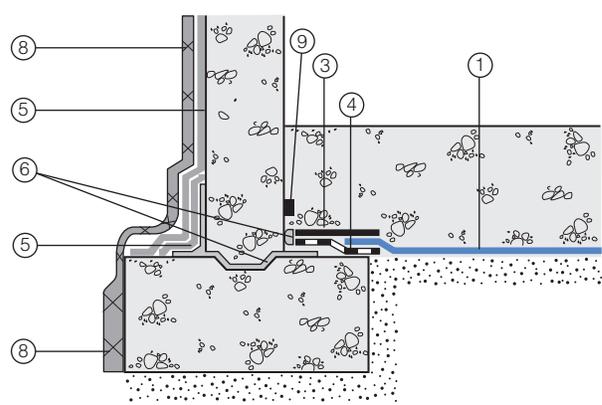
Procor wall base detail (Option 1)



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.

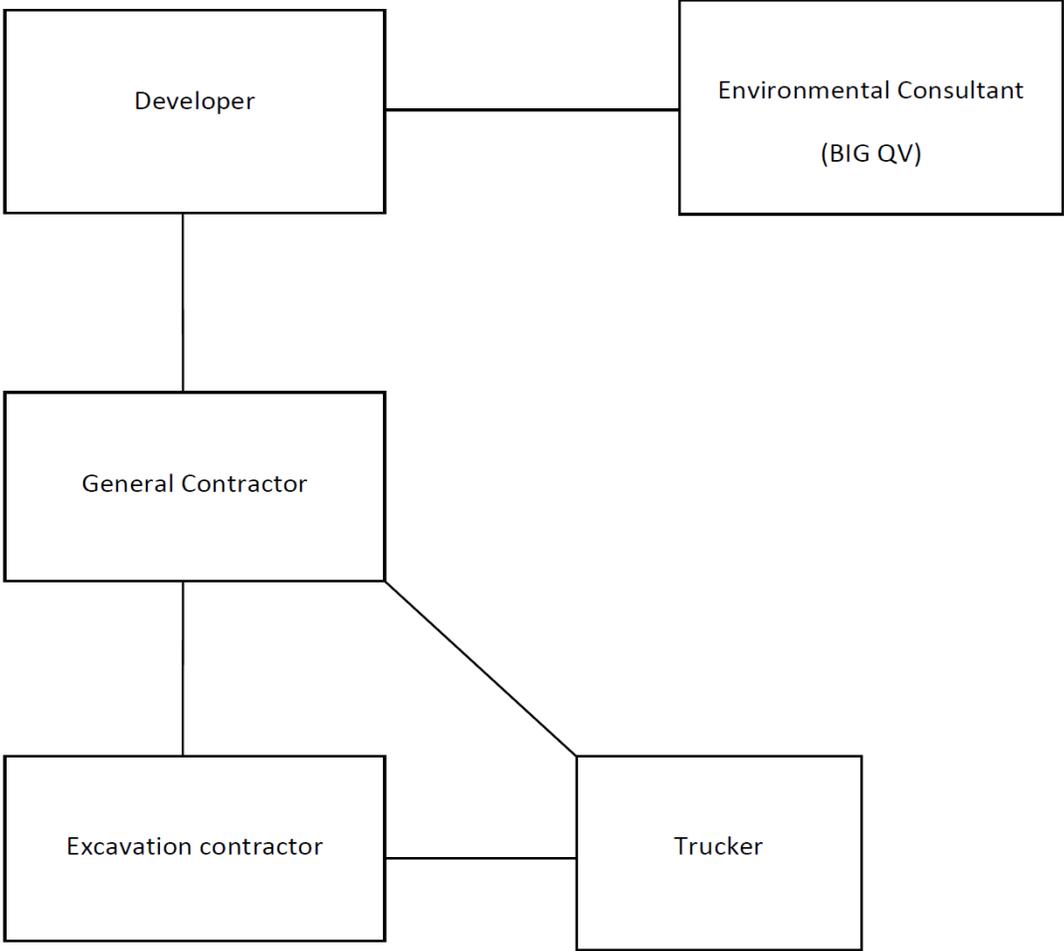
- Its environmental consultant(s) hired to oversee the cleanup must be:
 - a. a BIG Qualified Vendor; and
 - b. maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

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

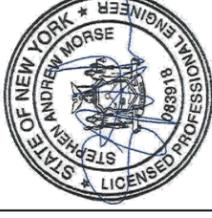
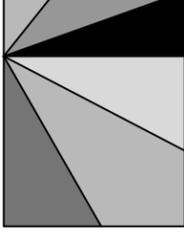
NYC Clean Soil Bank		Receiving Facility: Name/ Address (Approved by OER)			
Tracking No.:	13CCSB000				
Today	Trucks 5	Cu. Yds. 25	Total	Trucks 120	Cu. Yds. 600

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

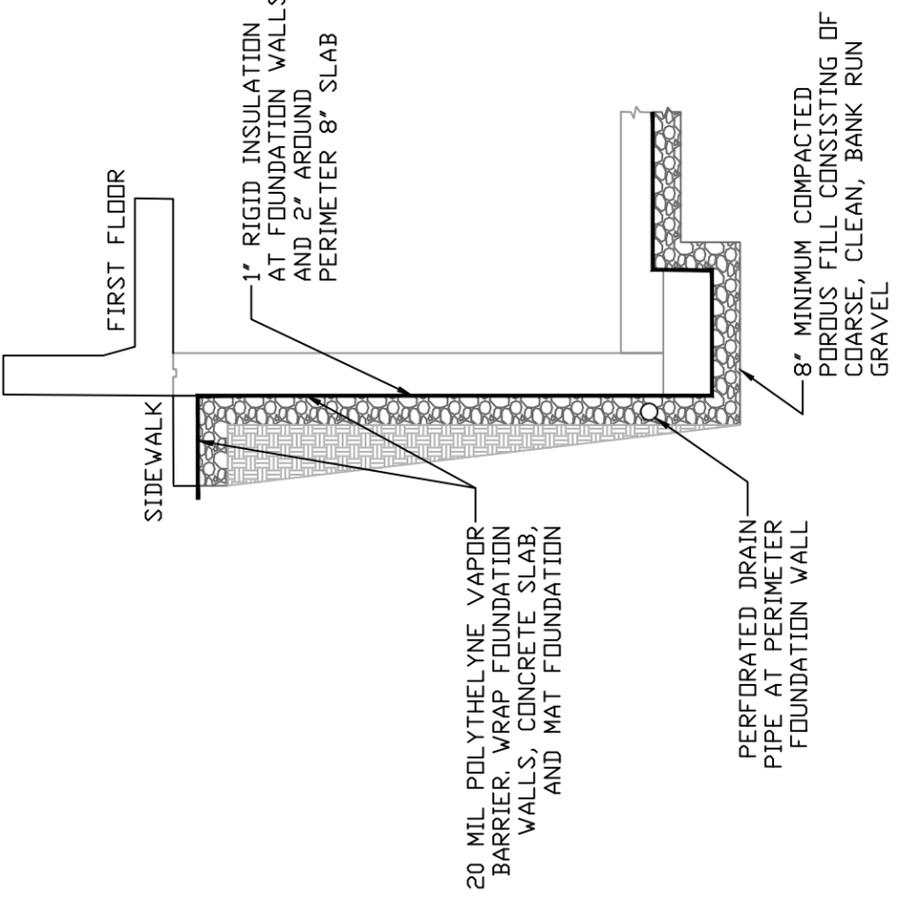
VAPOR BARRIER/
 WATERPROOFING MEMBRANE
 PLAN

DATE: 10/16/2013

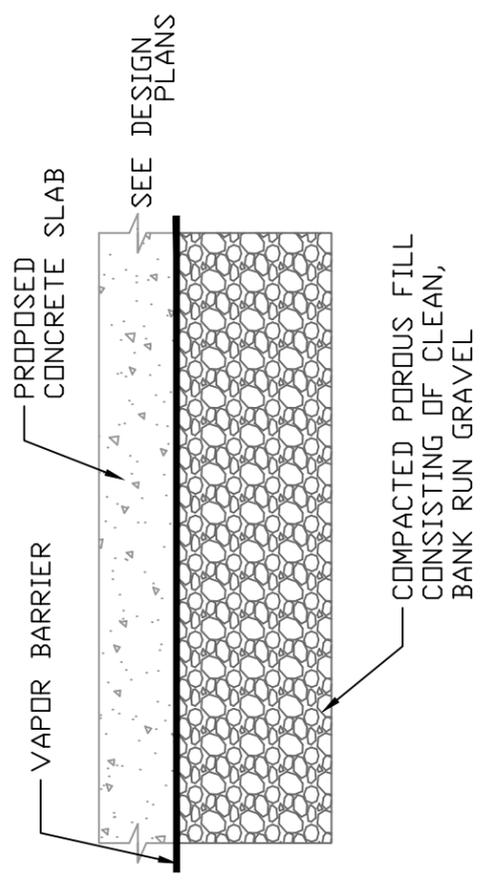
PAGE: 1 OF 2

SCALE: N.T.S.

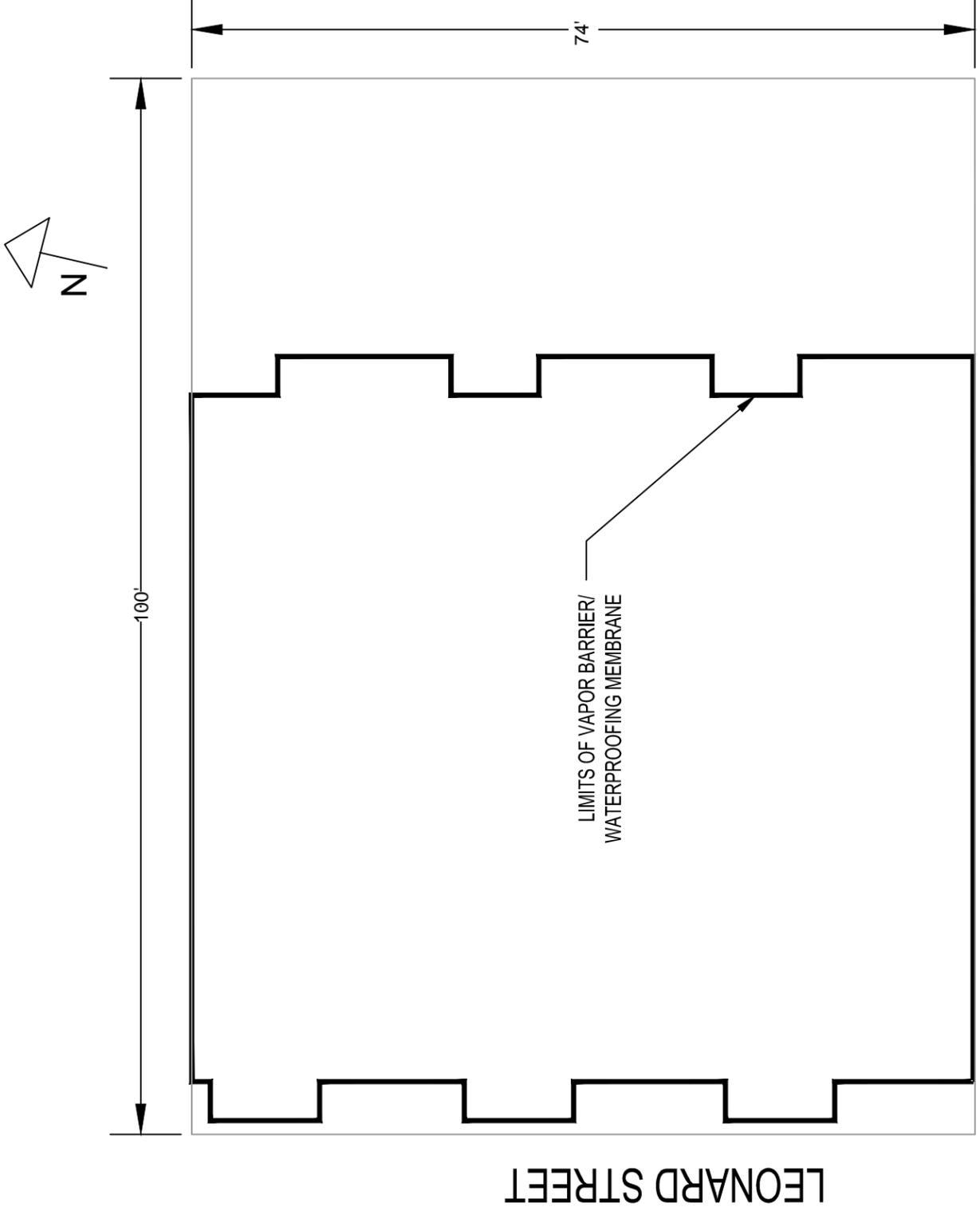
Drawn by: ESG



2 CELLAR COVER DETAIL
 N.T.S.



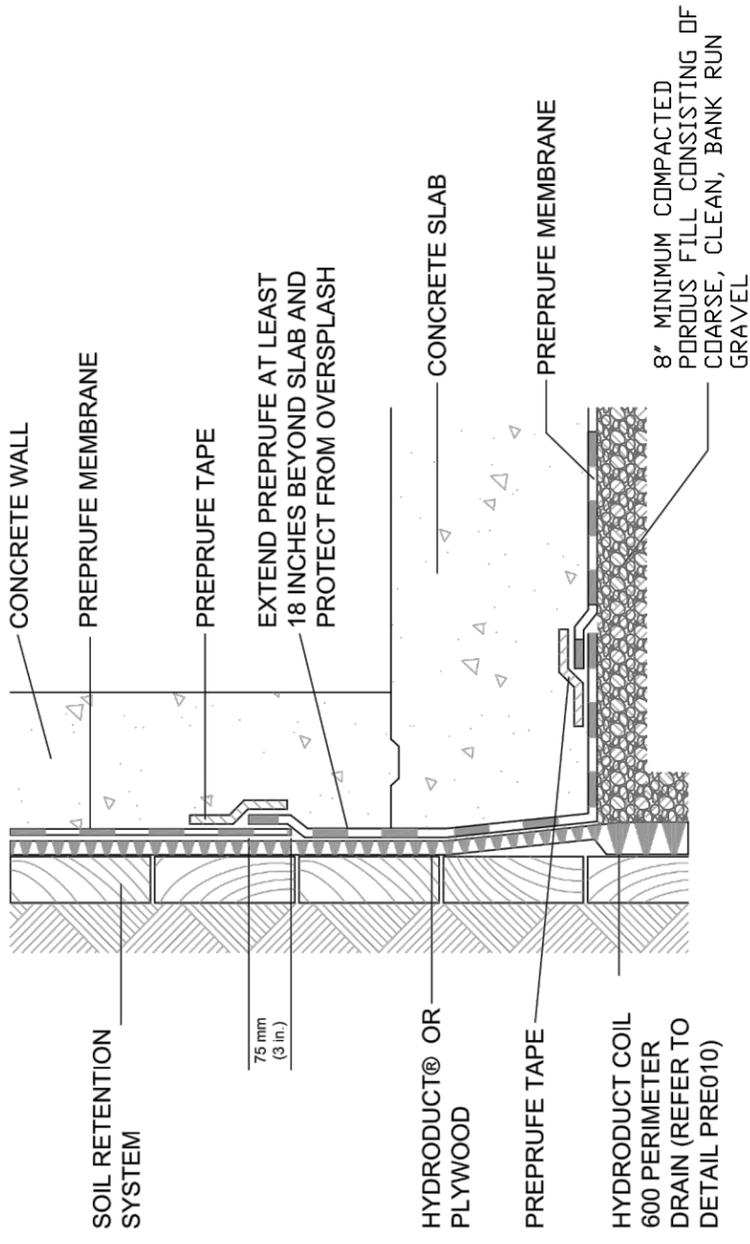
3 SOIL COVER DETAIL
 N.T.S.



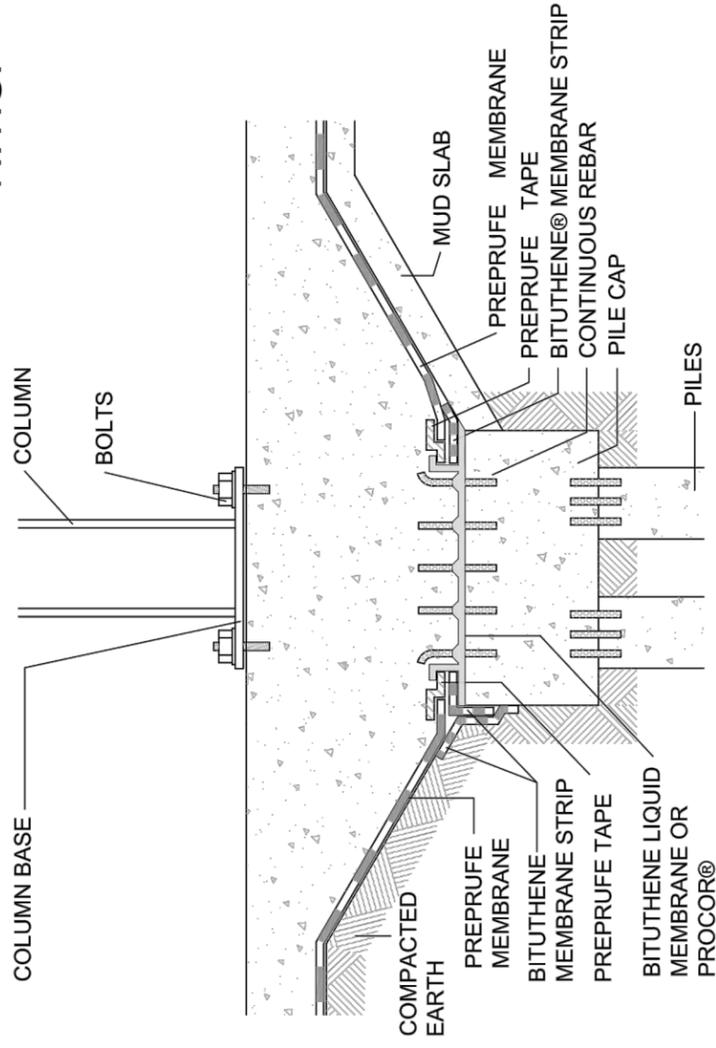
NOTE: FOP VAPOR BARRIER, SEE DETAILS 2 & 3. FOR WATERPROOFING MEMBRANE, SEE DETAILS 4 & 5 ON SHEET 2

1 VAPOR BARRIER BOUNDARY
 N.T.S.

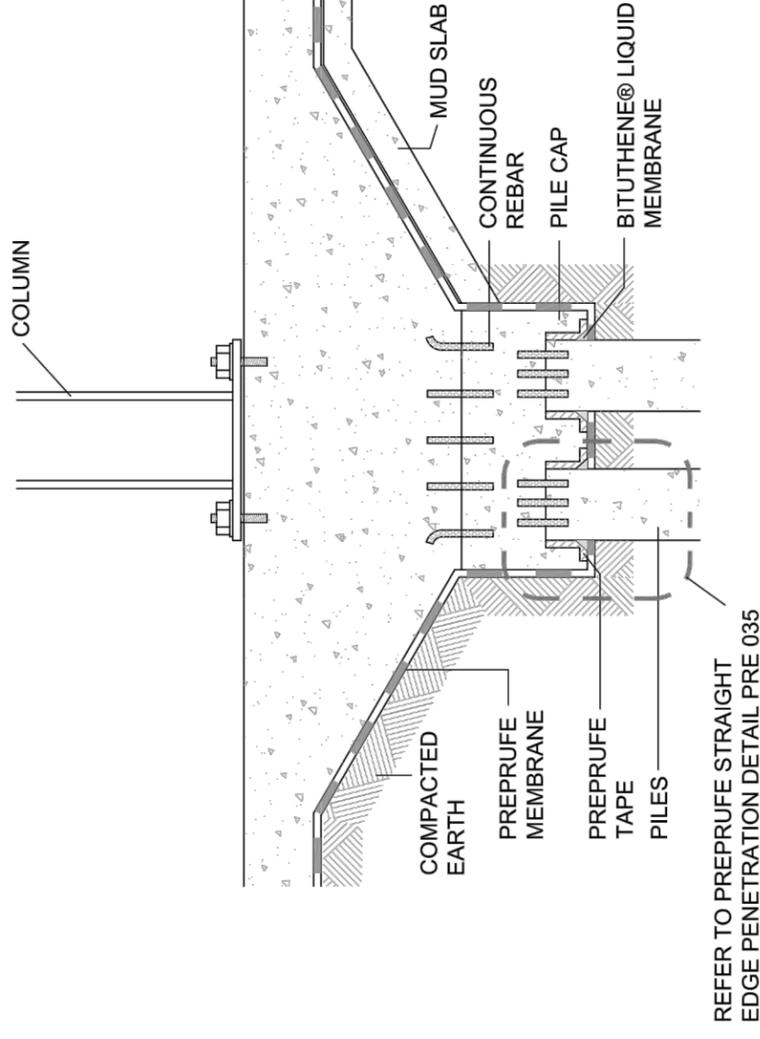
IF WATERPROOFING MEMBRANE IS IMPLEMENTED IN PLACE OF VAPOR BARRIER, CONTRACTOR TO INSTALL IN ACCORDANCE WITH THESE DETAILS. IF STRUCTURE IS TO BE SUPPORTED BY PILE FOUNDATIONS, WATERPROOFING MEMBRANE SHALL BE INSTALLED IN ACCORDANCE WITH DETAIL 5A OR DETAIL 5B.



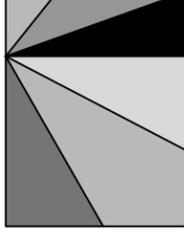
4 PREPRUFE MEMBRANE AT CELLAR LEVEL
N.T.S.



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

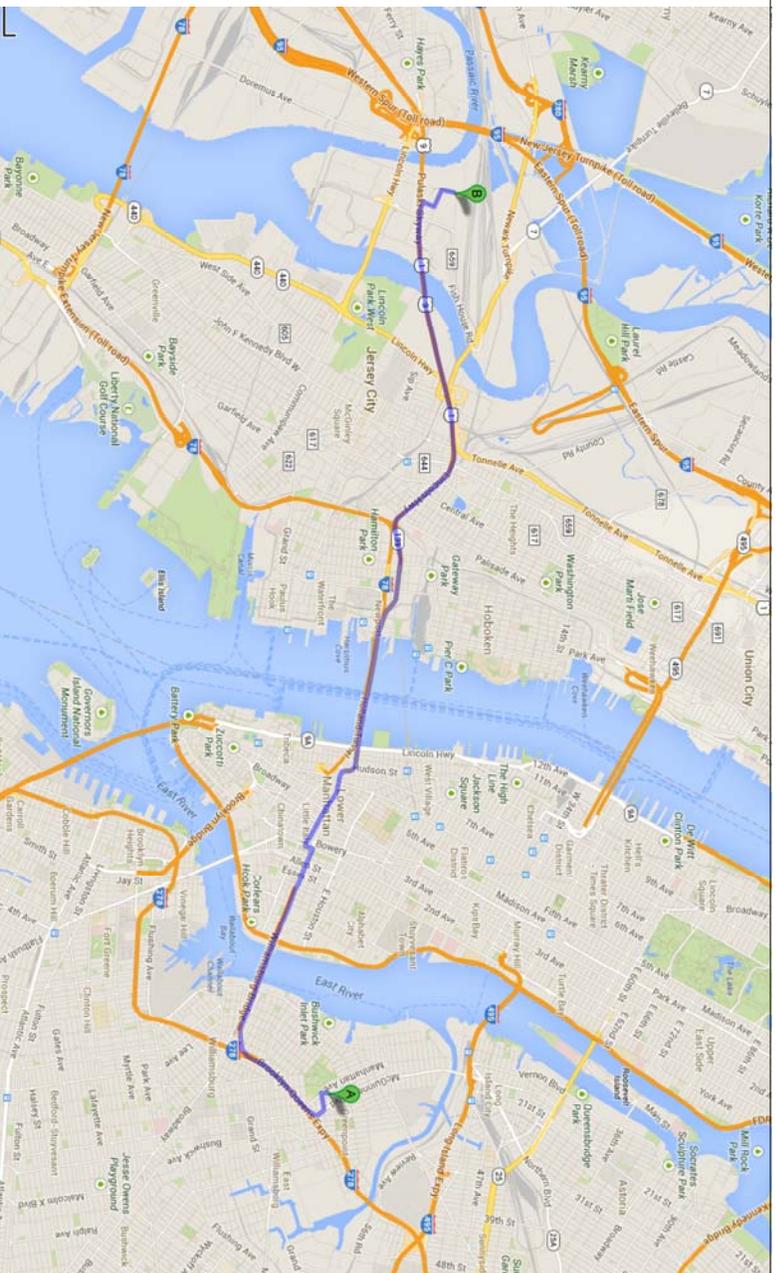
PAGE: 2 OF 2

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

October 2013

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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

TABLES

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 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/m³). 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/m³.
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/m³), carbon tetrachloride (23 ug/m³), tetrachloroethylene (50 ug/m³), and trichloroethylene (20 ug/m³) 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:

<u>Contaminant</u>	<u>SCO</u>
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

Instrument (make/model)	Purpose and Frequency	Response Ranges	Field Check Gas
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.
Instrument (make/model)	Purpose and Frequency	Response Ranges	Field Check Gas
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:

Contaminant	Range	L.O.P.
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 (Woodhull Medical Center)	911 or (718) 963-8000
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.

Driving directions to Woodhull Medical Center		
	498 Leonard St Brooklyn, NY 11222	
	1. Head south on Leonard St 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 Destination will be on the right	
		0.6 mi
	Woodhull Medical Center 760 Broadway Brooklyn, NY 11206	

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.

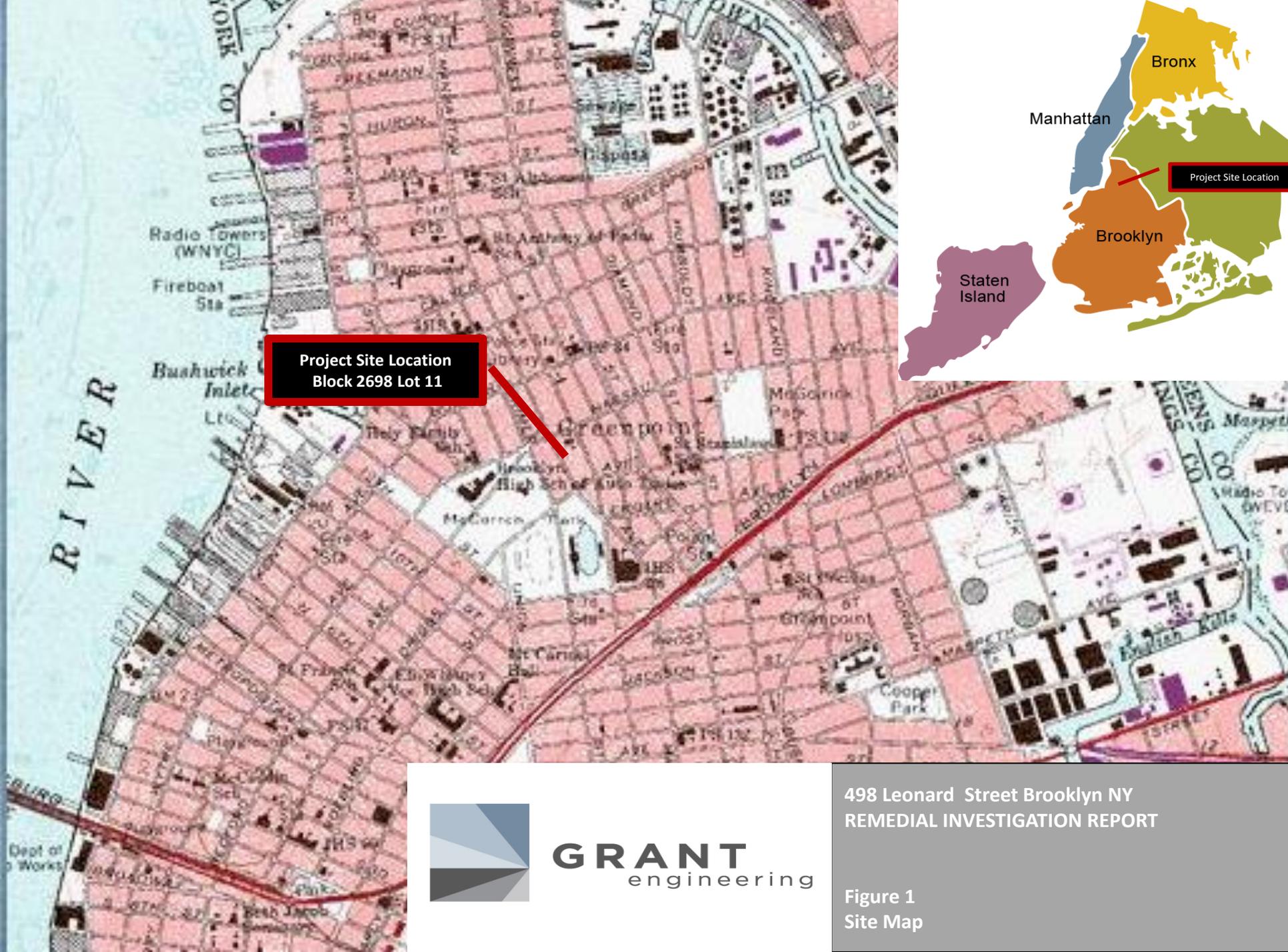
A Site map indicating all planned work areas is presented as Figure 2 in this report and will be made available to all site personnel.

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



GRANT
engineering

Figure 1
Site Map



Leonard Street

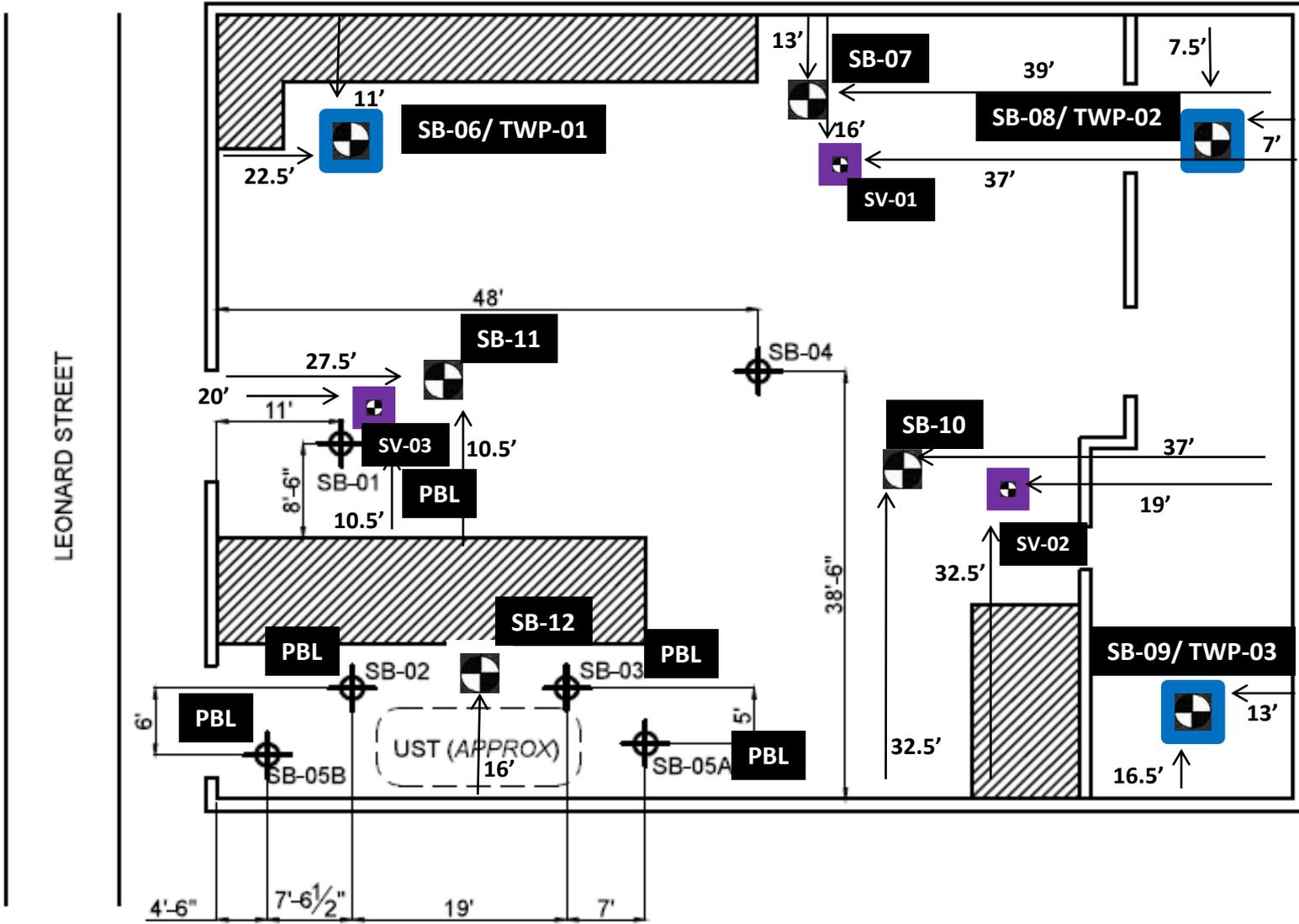
498 Leonard St.



GRANT
engineering

498 Leonard Street Brooklyn NY
REMEDIAL INVESTIGATION REPORT

Figure 2
Site Location Plan



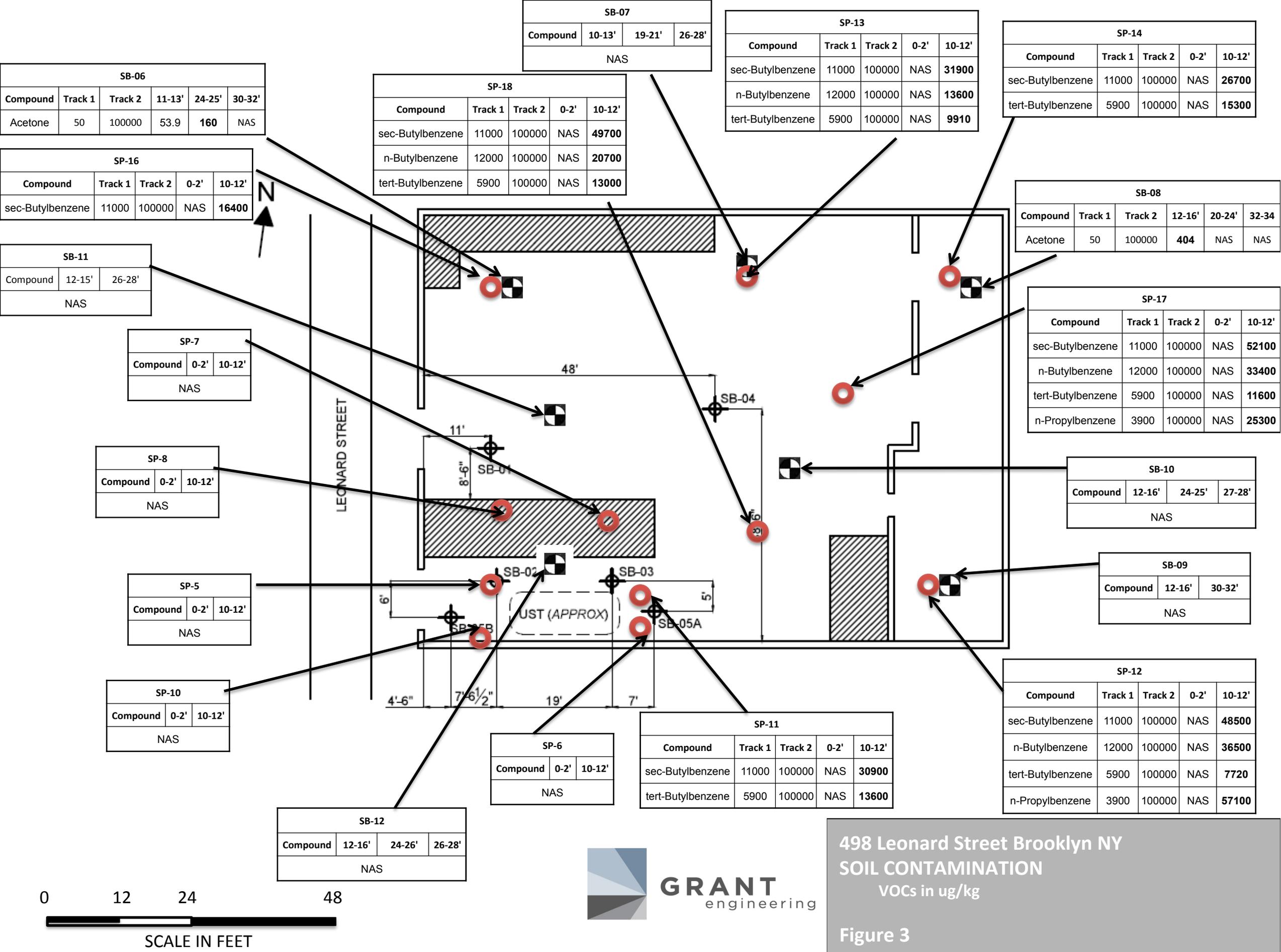
Legend

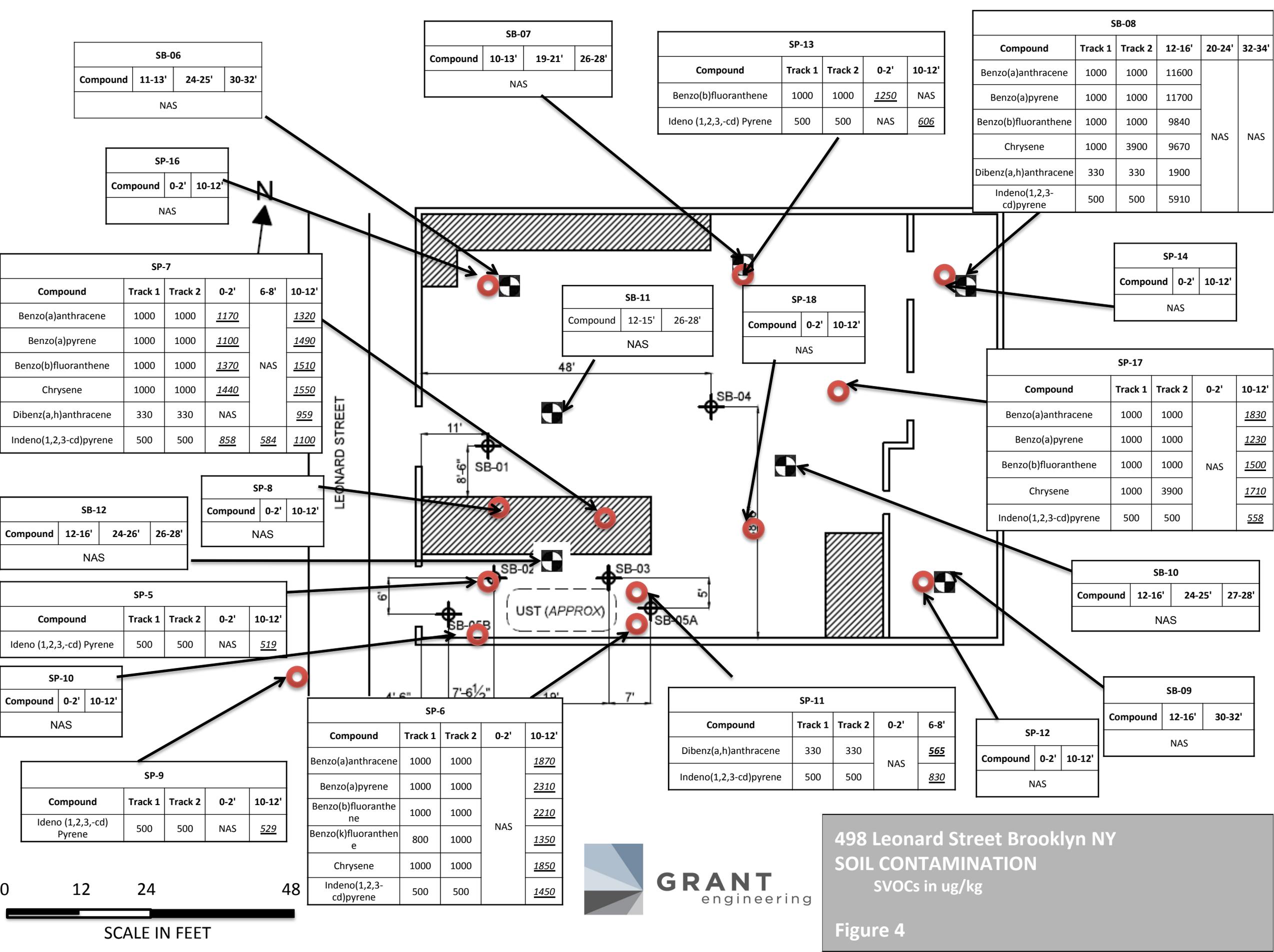
- Soil Boring and Temporary Well Location
- Soil Boring
- Soil Vapor Location
- Previous Boring Location Completed in February 2013



498 Leonard Street Brooklyn NY
BORING LOCATION PLAN
REMEDIAL INVESTIGATION REPORT

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			
			<u>558</u>		

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>

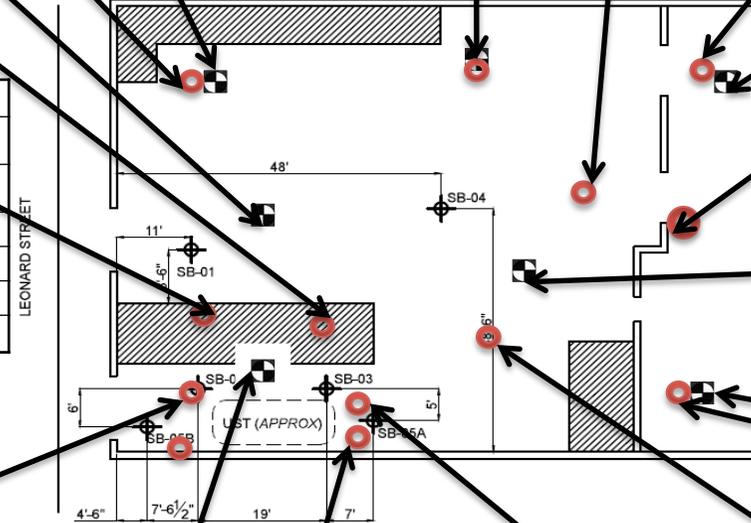
SB-07					
Compound	Track 1	Track 2	10-13'	19-21'	26-28'
Arsenic	13	16	<u>17.6</u>	NAS	NAS
Copper	50	270	<u>87.7</u>		
Lead	63	400	<u>1440</u>		
Zinc	109	10000	<u>174</u>		

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

0 12 24 48

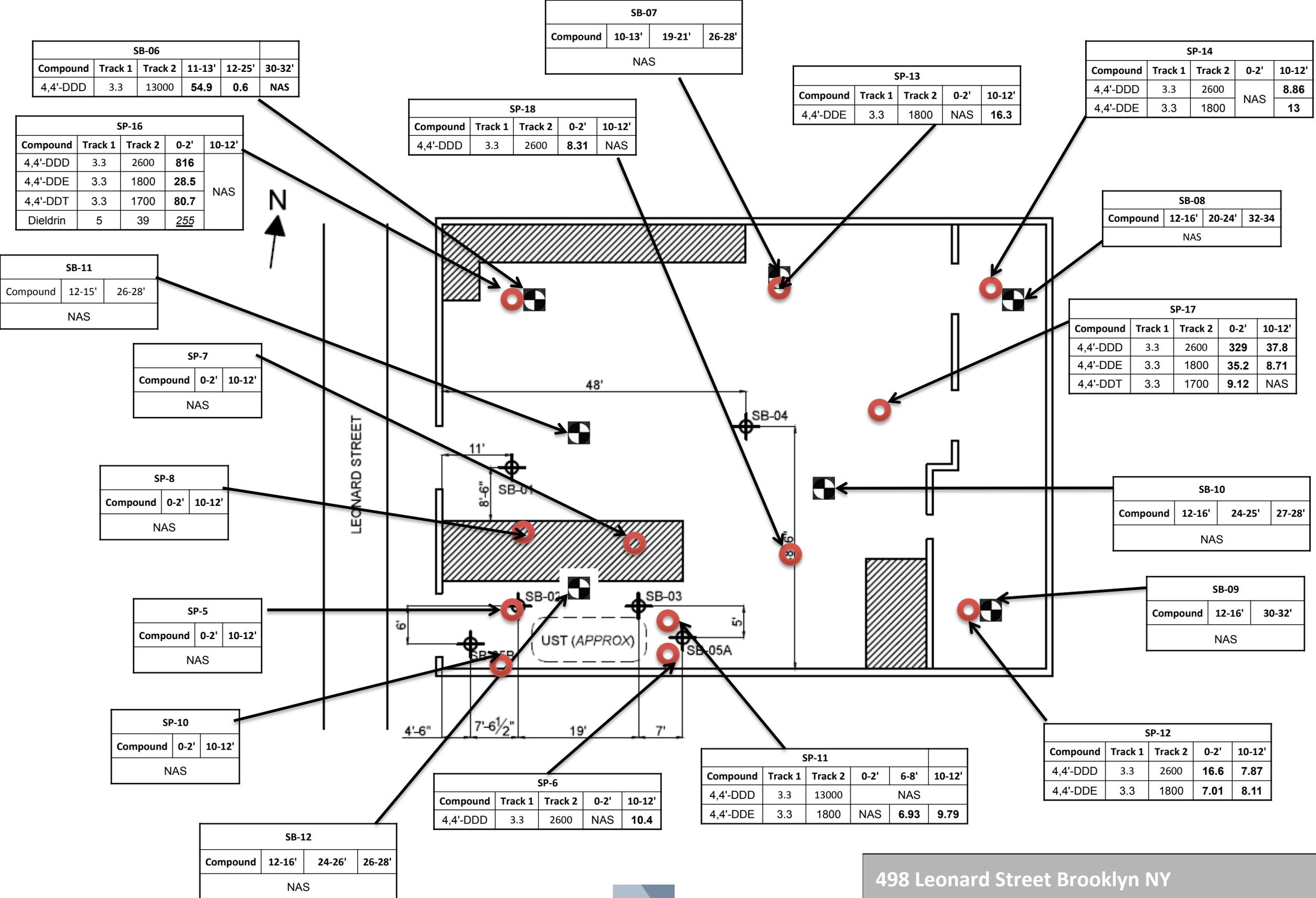
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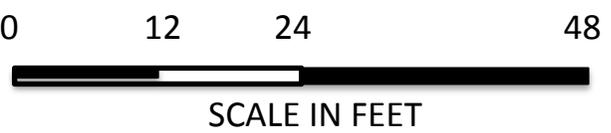
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498 Leonard Street Brooklyn NY
SOIL CONTAMINATION
Metals in mg/kg

Figure 5



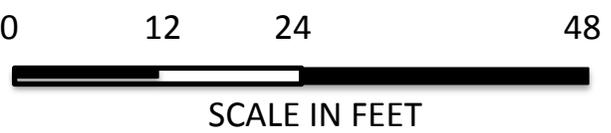
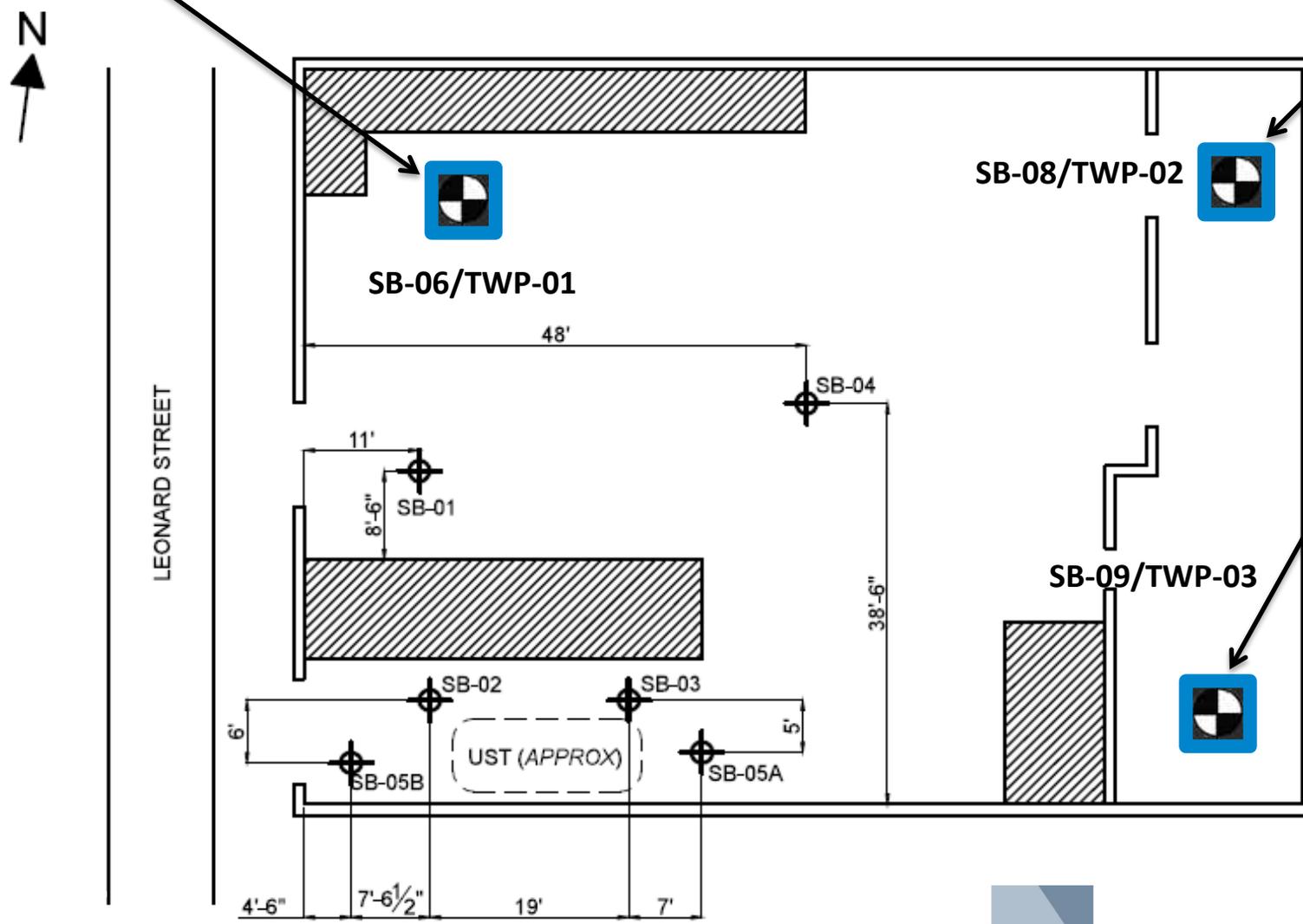
498 Leonard Street Brooklyn NY
SOIL CONTAMINATION
 Pesticides in ug/kg
Figure 6



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

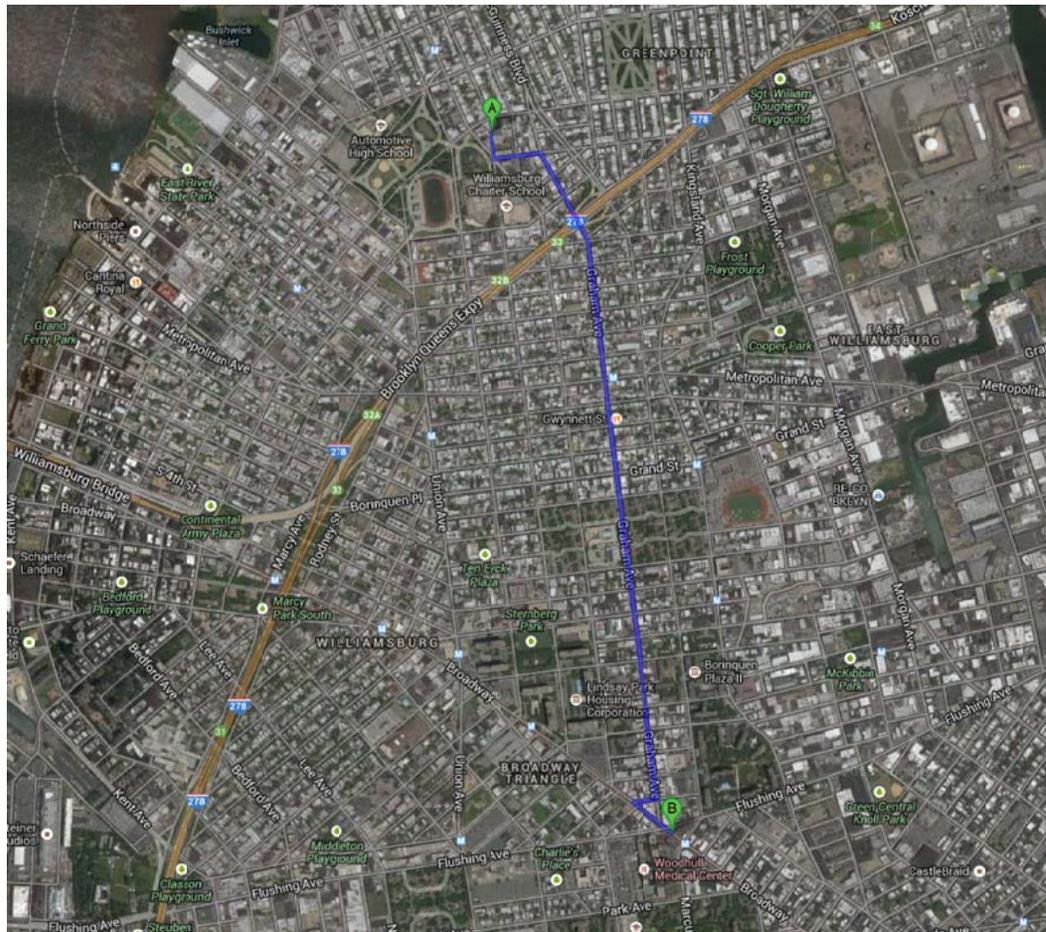
Values that are **bold** exceed Track 1 SCOs

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 Sampling Date Client/Matrix RptUnits	Compound	CASNumber	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 4/23/2013 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	Result	Q	Result	Q	Result	Q													
Volatiles, EPA TCL List																																
Acetone	67-64-1	50	U	100000	53.9	U	160	8.37	U	46.2	U	17.5	U	7.63	U	404	8.23	U	8.71	U	48.6	U	7.97	U	43.5	U	26.9	U	7.63	U		
Carbon Tetrachloride	56-23-5	760	U	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	2.14	U	11.7	U	7.2	U	2.05	U
Chloroform	67-66-3	370	U	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
Benzene	71-43-2	60	U	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
1,1,1-Trichloroethane	71-55-6	680	U	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
Bromomethane	74-83-9	~	U	~	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
Chloromethane	74-87-3	~	U	~	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
Dibromomethane	74-95-3	~	U	~	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
Bromochloromethane	74-97-5	~	U	~	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
Chloroethane	75-00-3	~	U	~	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
Vinyl Chloride	75-01-4	20	U	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
Methylene Chloride	75-09-2	50	U	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
Carbon disulfide	75-15-10	2700	U	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
Bromoform	75-25-2	~	U	~	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
Bromodichloromethane	75-27-4	~	U	~	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
1,1-Dichloroethane	75-34-3	270	U	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
1,1-Dichloroethene	75-35-4	330	U	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
Tertiary butyl alcohol	75-65-0	~	U	~	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
Trichlorofluoromethane	75-69-4	~	U	~	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
Dichlorodifluoromethane	75-71-8	~	U	~	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
1,1,2-Trichlorotrifluoroethane (113 Freon)	76-13-1	6000	U	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
1,2-Dichloropropane	78-87-5	~	U	~	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
2-Butanone	78-93-3	300	U	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
1,1,2-Trichloroethane	79-00-5	~	U	~	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
Trichloroethene	79-01-6	470	U	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
1,1,2,2-Tetrachloroethane	79-34-5	600	U	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
1,2,3-Trichlorobenzene	87-61-6	20000	U	~	14.1	U	2.34	U	2.18	U	12.1	U	4.66	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
Hexachlorobutadiene	87-68-3	~	U	~	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
Naphthalene	91-20-3	12000	U	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	5.53	U	1.57	U
o-xylene	95-47-6	~	U	~	17.5	U	2.91	U	2.72	U	15	U	14	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
2-Chlorotoluene	95-49-8	~	U	~	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	2.73	U	14.9	U	9.19	U	2.61	U
1,2-Dichlorobenzene	95-50-1	1100	U	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
1,2,4-Trimethylbenzene	95-63-6	3600	U	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	8710	E	2.57	U	14	U	8.68	U	2.46	U
1,2,4,5-Tetramethylbenzene	95-93-2	~	U	~	1320	E	28.5	U	1.96	U	956	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
1,2-Dibromo-3-chloropropane	96-12-8	~	U	~	8.07	U	1.34	U	1.25	U	6.92	U	2.62	U	1.14	U	7.31	U	1.23	U	1.3	U	1.19	U	1.19	U	6.5	U	4.02	U	1.14	U
1,2,3-Trichloropropane	96-18-4	340	U	80000	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	2.2	U	11.6	U	7.16	U	2.03	U
tert-Butylbenzene	98-82-8	5,900	U	100000	2980	E	16.1	U	2.58	U	1540	E	5.39	U	4.55	J	264	U	5.12	U	2.68	U	494	U	2.45	U	583	U	31.7	U	2.35	U
Isopropylbenzene	98-82-8	2,300	U	100,000	994	U	11	U	2.63	U	14.5	U	5.49	U	2.4	U	55.2	U	2.59	U	2.73	U	2070	U	2.5	U	162	U	25.9	U	2.4	U
p-Isopropyltoluene	99-87-6	10000	U	~	17.2	U	2.86	U	2.67	U	14.7	U	5.57	U	2.43	U	15.6	U	2.62													

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 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	Result	Q	Result	Q	Result	Q								
1,3-Dichlorobenzene	541-73-1	2400	U	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	U	45.8	U	38.1	U	35.6	U	39.3	U	32.4	U	34.9	U	37	U	41.4	U	33.9	U	36.9	U	114	U	32.5	U
2,3,4,6-Tetrachlorophenol	58-90-2	~	U	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	U	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	U	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	~	U	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	~	U	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	~	U	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	~	U	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	~	U	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	~	U	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	U	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	U	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	U	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	34.9	U	37.2	U
2-Nitroaniline	88-74-4	~	U	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	15.6	U	16.9	U
2-Nitrophenol	88-75-5	300	U	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	15.5	U	17	U
3,4-Methylphenol	100-01-6	~	U	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	~	U	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	~	U	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	~	U	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	~	U	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	~	U	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	U	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	~	U	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	~	U	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	U	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	U	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	U	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	U	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	U	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	~	U	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	U	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	U	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	U	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	U	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	U	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	U	18400	U	15300	U	14300	U	15800	U	29800	U	13000	U	14800	U	13000	U	14800	U	16600	U	13600	U	14800	U
Benzyl alcohol	100-51-6	~	U	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	U	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	~	U	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	U	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	U	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	~	U	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	~	U	62.8	U	92.8	U	94.2	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	U	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	~	U	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	U	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	~	U	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	U	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	U	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	U	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	~	U	55.3	U	45.9	U	42.9	U	47.4	U	89.6	U	39	U	50.1	U	42.1	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			
			ug/kg dry	ug/kg dry	Result	Q	Result	Q	Result	Q	Result	Q
	Volatile Organics, TCL (Target Compound List)				ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry	
	Acetone	67-64-1	50	100000	45.6	U	8.37	U	53	U	102	U
	Carbon Tetrachloride	56-23-5	760	2400	12.2	U	2.24	U	14.2	U	27.3	U
	Chloroform	67-66-3	370	49000	13.6	U	2.5	U	15.9	U	30.5	U
	Benzene	71-43-2	60	4800	12.6	U	2.32	U	14.7	U	28.2	U
	1,1,1-Trichloroethane	71-55-6	680	100000	12.3	U	2.26	U	14.3	U	27.5	U
	Bromomethane	74-83-9	~	~	13.6	U	2.49	U	15.8	U	30.4	U
	Chloromethane	74-87-3	~	~	10.1	U	1.85	U	11.7	U	22.5	U
	Dibromomethane	74-95-3	~	~	10.8	U	1.98	U	12.6	U	24.2	U
	Bromochloromethane	74-97-5	~	~	13.4	U	2.46	U	15.5	U	29.9	U
	Chloroethane	75-00-3	~	~	13.5	U	2.48	U	15.7	U	30.2	U
	Vinyl Chloride	75-01-4	20	900	14.9	U	2.73	U	17.3	U	33.2	U
	Methylene Chloride	75-09-2	50	100000	12.7	U	2.33	U	14.8	U	28.4	U
	Carbon disulfide	75-15-10	2700	100000	13.2	U	1.62	U	10.3	U	19.8	U
	Bromoforn	75-25-2	~	~	6.14	U	1.13	U	7.14	U	13.7	U
	Bromodichloromethane	75-27-4	~	~	8.37	U	1.54	U	9.73	U	18.7	U
	1,1-Dichloroethane	75-34-3	270	26000	10.8	U	1.98	U	12.6	U	24.2	U
	1,1-Dichloroethene	75-35-4	330	100000	12.8	U	2.34	U	14.8	U	28.5	U
	Tertiary butyl alcohol	75-65-0	~	~	102	U	18.7	U	119	U	228	U
	Trichlorofluoromethane	75-69-4	~	~	12.9	U	2.37	U	15	U	28.8	U
	Dichlorodifluoromethane	75-71-8	~	~	7.02	U	1.29	U	8.16	U	15.7	U
	1,1,2-Trichlorotrifluoroethane (113 Freon)	76-13-1	6000	100000	11.6	U	2.13	U	13.5	U	26	U
	1,2-Dichloropropane	78-87-5	~	~	13.6	U	2.5	U	15.9	U	30.5	U
	2-Butanone	78-93-3	300	100000	24.5	U	4.5	U	28.5	U	54.8	U
	1,1,2-Trichloroethane	79-00-5	~	~	12.9	U	2.37	U	15	U	28.8	U
	Trichloroethene	79-01-6	470	21000	11.7	U	2.16	U	13.7	U	26.3	U
	1,1,2,2-Tetrachloroethane	79-34-5	600	35000	13.4	U	2.47	U	15.6	U	30	U
	1,2,3-Trichlorobenzene	87-61-6	20000	~	11.9	U	2.18	U	13.8	U	26.6	U
	Hexachlorobutadiene	87-68-3	~	~	12.1	U	2.23	U	14.1	U	27.2	U
	Naphthalene	91-20-3	12000	100000	9.38	U	1.72	U	435	U	409	U
	o-xylene	95-47-6	~	~	14.8	U	2.72	U	108	U	142	U
	2-Chlorotoluene	95-49-8	~	~	15.6	U	2.86	U	18.1	U	34.9	U
	1,2-Dichlorobenzene	95-50-1	1100	100000	14	U	2.58	U	16.3	U	31.4	U
	1,2,4-Trimethylbenzene	95-63-6	3600	52000	14.7	U	2.7	U	364	U	473	U
	1,2,4,5-Tetramethylbenzene	95-93-2	~	~	1490	E	1.96	U	1820	E	763	U
	1,2-Dibromo-3-chloropropane	96-12-8	~	~	6.82	U	1.25	U	7.93	U	15.3	U
	1,2,3-Trichloropropane	96-18-4	340	80000	693	U	2.23	U	14.1	U	27.2	U
	tert-Butylbenzene	98-82-8	5,900	100000	1020	U	2.58	U	246	U	113	U
	Isopropylbenzene	98-82-8	2,300	100,000	234	U	2.63	U	384	U	230	U
	p-Isopropyltoluene	99-87-6	10000	~	14.5	U	2.67	U	86.3	U	130	U
	Ethylbenzene	100-41-4	1000	41000	11.9	U	2.19	U	281	U	240	U
	Styrene	100-42-5	300000	~	12.2	U	2.24	U	14.2	U	27.3	U
	n-Propylbenzene	103-65-1	3900	100000	207	U	2.42	U	684	U	389	U
	n-Butylbenzene	104-51-8	12000	100000	1490	E	2.67	U	803	U	381	U
	p-Diethylbenzene	105-05-5	~	~	13.4	E	2.46	U	370	U	234	U
	4-Chlorotoluene	106-43-4	~	~	14	U	2.57	U	16.2	U	31.3	U
	1,4-Dichlorobenzene	106-46-7	1800	13000	14.3	U	2.63	U	16.6	U	32	U
	1,2-Dibromoethane	106-93-4	~	~	12.6	U	2.32	U	14.7	U	28.2	U
	1,2-Dichloroethane	107-06-2	20	3100	13.6	U	2.49	U	15.8	U	30.4	U
	Acrylonitrile	107-13-1	~	~	26.3	U	4.82	U	30.5	U	58.7	U
	4-Methyl-2-pentanone	108-10-1	1000	~	32.8	U	6.03	U	38.2	U	73.4	U
	m,p-xylene	1330-20-7P/M	~	~	28.2	U	5.18	U	90.1	U	106	U
	1,3,5-Trimethylbenzene	108-67-8	8400	52000	14.6	U	2.68	U	125	U	135	U
	Bromobenzene	108-86-1	~	~	14.6	U	2.69	U	17	U	32.8	U
	Toluene	108-88-3	700	100000	24.7	U	2.39	U	14.9	U	35.7	U
	Chlorobenzene	108-90-7	1100	100000	14.4	U	2.65	U	16.8	U	32.3	U
	2-Chloroethylvinylether	110-75-8	~	~	19.4	U	3.57	U	22.6	U	43.5	U
	1,2,4-Trichlorobenzene	120-82-1	20000	~	12.6	U	2.31	U	14.6	U	28.1	U
	Dibromochloromethane	124-48-1	~	~	8.03	U	1.48	U	9.34	U	18	U
	Tetrachloroethene	127-18-4	1300	19000	14.4	U	2.65	U	16.8	U	32.3	U
	sec-Butylbenzene	135-98-8	11000	100000	14.7	U	2.7	U	1320	E	451	U
	1,3-Dichloropropane	142-28-9	300	~	14.8	U	2.72	U	17.2	U	33.1	U
	c-1,2-Dichloroethene	156-59-2	250	100000	12.5	U	2.29	U	14.5	U	27.9	U
	t-1,2-Dichloroethene	156-60-5	190	100000	12.3	U	2.26	U	14.3	U	27.5	U
	1,3-Dichlorobenzene	541-73-1	2400	49000	13.7	U	2.52	U	15.9	U	30.7	U
	1,1-Dichloropropene	563-58-6	~	~	11.8	U	2.17	U	13.7	U	26.4	U
	2,2-Dichloropropene	590-20-7	~	~	11.7	U	2.15	U	13.6	U	26.1	U
	2-Hexanone	591-78-6	~	~	21.7	U	3.98	U	25.2	U	48.5	U
	p-Ethyltoluene	622-96-8	~	~	14.4	U	2.65	U	149	U	144	U
	1,1,1,2-Tetrachloroethane	630-20-6	~	~	12.6	U	2.31	U	14.6	U	28.1	U
	TAME	994-05-08	~	~	11.9	U	2.18	U	13.8	U	26.6	U
	Methyl t-butyl ether	1634-04-4	930	100000	11.6	U	2.13	U	13.5	U	26	U
	c-1,3-Dichloropropene	10061-01-05	~	~	13.1	U	2.41	U	15.2	U	29.3	U
	t-1,3-Dichloropropene	10061-02-6	~	~	9.79	U	1.8	U	11.4	U	21.9	U
	Semi-Volatiles, EPA TCL List		ug/kg dry	ug/kg dry	ug/kg dry		ug/kg dry		ug/kg dry		ug/kg dry	
	1,2,4-Trichlorobenzene	120-82-1	~	~	53.3	U	48.9	U	62	U	119	U
	1,2-Dichlorobenzene	95-50-1	1100	100000	43.2	U	39.6	U	50.2	U	96.4	U
	1,2-Diphenylhydrazine	122-66-7	~	~	48.9	U	44.8	U	56.8	U	109	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 Client/Matrix 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
Metals, Target Analyte List			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	
Mercury by 7470/7471			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	
Total Solids			%	%	%		%		%		%		%	
% Solids	solids		~	~	74.1		80.8		63.7		33.2		80	
GC Fingerprint - EPA 310.14			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
Volatile Organics, TCL (Target Compound List)		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
Semi-Volatiles, EPA TCL List		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
PCBs, Pesticides, Herbicides EPA 8082/8081/8321 List								
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
Metals, Dissolved - Target Analyte (TAL)								
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	Q	Result	Q	Result	Q
Zinc	7440-66-6	~	0.23		0.024		0.016	
Metals, Target Analyte		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	
Mercury by 7470/7471		mg/L	mg/L		mg/L		mg/L	
Mercury	7439-97-6	0.0007	0.0031		0.00044		0.00054	
Mercury, Dissolved		mg/L	mg/L		mg/L		mg/L	
Mercury	7439-97-6	0.0007	0.0016		0.00038		0.00058	
GC Fingerprint - EPA 310.14		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 ³		Y73/SV-02 13D0913-02 4/24/2013 72 Soil Vapor ug/m ³		Y26/SV-03 13D0913-03 4/24/2013 28.31 Soil Vapor ug/m ³	
Compound	CASNumber		Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List								
			ug/m ³		ug/m ³		ug/m ³	
1,1,1-Trichloroethane	71-55-6	DOH Matrix 2 < 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	~	110	D	36	U	75	D
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	~	37	D	36	U	21	D
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	~	95	D	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	~	220	D	57	D	21	D
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	~	75	D	100	D	9.0	U
Carbon tetrachloride	56-23-5	DOH Matrix 1 < 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	47	D	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	~	29	D	29	U	11	U
cis-1,3-Dichloropropylene	10061-01-5	~	8.8	U	33	U	13	U
Cyclohexane	110-82-7	~	1100	D	78	D	12	D
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	D	32	U	43	D
Hexachlorobutadiene	87-68-3	~	21	U	78	U	31	U
Isopropanol	67-63-0	~	350	D	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	43	D	13	D
n-Heptane	142-82-5	~	8.0	U	30	U	17	D
n-Hexane	110-54-3	~	100	D	26	U	11	D
o-Xylene	95-47-6	~	96	D	32	U	59	D
p- & m- Xylenes	179601-23-1	~	380	D	67	D	160	D
p-Ethyltoluene	622-96-8	~	120	D	180	U	82	D
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 < 100 100 - 1,000 1,000 and above	20 NFA / Reasonable Action	D	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	~	200	D	44	D	90	D
trans-1,2-Dichloroethylene	156-60-5	~	12	D	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 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

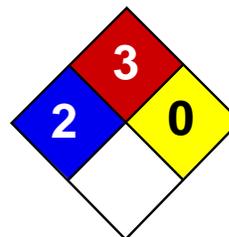
D=result is from an analysis that required a dilutor

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

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

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

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

Section 3: Hazards Identification

Potential Acute Health Effects:

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

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. **MUTAGENIC EFFECTS:** Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

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

Serious Skin Contact:

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

Inhalation:

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

Serious Inhalation:

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

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

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

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

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

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

Fire Hazards in Presence of Various Substances:

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

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

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

Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:

Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, 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/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m3) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m3) [Canada] TWA: 0.5 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:

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

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

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

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

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

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

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

Ionicity (in Water): Not available.

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

Solubility:

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

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

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

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

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

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:

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

Chronic Effects on Humans:

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

Other Toxic Effects on Humans:

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

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

Special Remarks on other Toxic Effects on Humans:

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

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

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

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

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

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

DSCL (EEC):

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

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

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

Section 16: Other Information

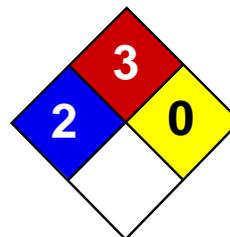
References: Not available.

Other Special Considerations: Not available.

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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: C₈H₁₀

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

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

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

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

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

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (irritant, sensitizer). **CARCINOGENIC EFFECTS:** Classified 2B (Possible for human.) by IARC. **MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

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

Serious Inhalation:

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

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:

CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

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

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

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

Special Remarks on Fire Hazards:

Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

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

Large Spill:

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

Section 7: Handling and Storage

Precautions:

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

Storage:

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

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m³) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

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

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 3.1$

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:**

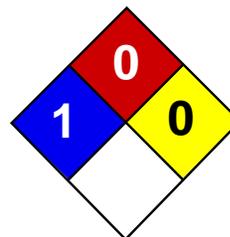
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey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

Other Special Considerations: Not available.

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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

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

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

Serious Inhalation: Not available.

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 0.05 (mg/m³) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m³) from OSHA (PEL) [United States] TWA: 0.03 (mg/m³) from NIOSH [United States] TWA: 0.05 (mg/m³) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

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

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and 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

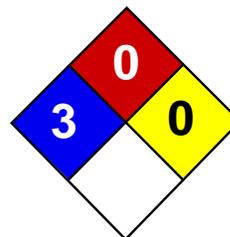
References: Not available.

Other Special Considerations: Not available.

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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

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/m³) from OSHA (PEL) [United States]
Inhalation TWA: 0.025 (mg/m³) [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

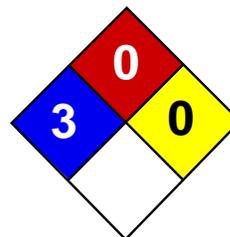
References: Not available.

Other Special Considerations: Not available.

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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

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/m³) from OSHA (PEL) [United States] Inhalation TWA: 0.025 (mg/m³) [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

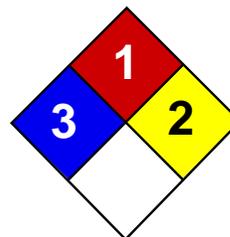
References: Not available.

Other Special Considerations: Not available.

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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

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:**

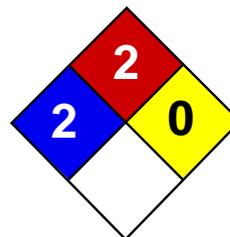
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérigènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la 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: C₁₀H₈

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

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

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

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

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

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

Section 3: Hazards Identification

Potential Acute Health Effects:

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

Potential Chronic Health Effects:

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

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

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

Serious Skin Contact: Not available.

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

Serious Inhalation:

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

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

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

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

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

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

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

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

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:

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

Section 7: Handling and Storage

Precautions:

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

Storage:

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

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

Israel: TWA: 10 (ppm) STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995]
Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

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

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:

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

Solubility:

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

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

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

Polymerization: No.

Section 11: Toxicological Information

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

Toxicity to Animals:

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

Chronic Effects on Humans:

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

Other Toxic Effects on Humans:

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

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

Section 12: Ecological Information

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

BOD5 and COD: Not available.

Products of Biodegradation:

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

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

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

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

DSCL (EEC):

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

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

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

Section 16: Other Information

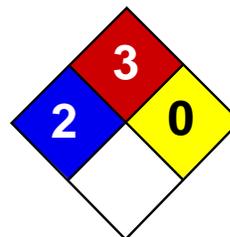
References: Not available.

Other Special Considerations: Not available.

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

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

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

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

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

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

Serious Skin Contact:

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

Inhalation:

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

Serious Inhalation:

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

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

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

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

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

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

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

Storage:

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

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

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

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m³) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

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

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

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

Ionicity (in Water): Not available.

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

Solubility:

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

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

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

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

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

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:

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

Chronic Effects on Humans:

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

Other Toxic Effects on Humans:

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

Special Remarks on Toxicity to Animals:

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

Special Remarks on Chronic Effects on Humans:

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

Special Remarks on other Toxic Effects on Humans:

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

Section 12: Ecological Information

Ecotoxicity:

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

BOD5 and COD: Not available.

Products of Biodegradation:

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

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

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

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

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

DSCL (EEC):

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

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

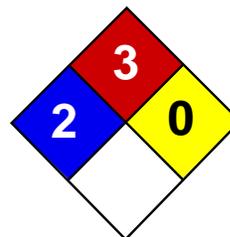
References: Not available.

Other Special Considerations: Not available.

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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: C₆H₄(CH₃)₂

Contact Information:

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

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

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

Serious Skin Contact:

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

Inhalation:

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

Serious Inhalation:

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

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

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

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

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

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:

Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

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

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

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

Storage:

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

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 100 (ppm) [Canada] TWA: 435 (mg/m³) [Canada] TWA: 434 STEL: 651 (mg/m³) from ACGIH (TLV) [United States]
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

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

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 3.1$

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.

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

2. COMPOSITION, INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

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.

5. FIRE FIGHTING MEASURES

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)

6. ACCIDENTAL RELEASE MEASURES

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).

7. HANDLING AND STORAGE

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.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

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.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas

COLOR: colorless

ODOR: faint odor, sweet odor

MOLECULAR WEIGHT: 62.50

MOLECULAR FORMULA: C-H₂-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

10. STABILITY AND REACTIVITY

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.

11. TOXICOLOGICAL INFORMATION

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.

12. ECOLOGICAL INFORMATION

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)

13. DISPOSAL CONSIDERATIONS

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.

14. TRANSPORT INFORMATION

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

15. REGULATORY INFORMATION

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.

16. OTHER INFORMATION

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